Cycle 12 Abstract Catalog

Generated April 04, 2003

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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9718
Title: SMC Extinction Curve Towards a Quiescent Molecular Cloud
PI: Francois Boulanger
PI Institution: Institut d'Astrophysique Spatiale

The lack of 2175 A bump in the SMC extinction curve is interpreted as an absence of small carbon grains. ISO Mid-IR observations support this interpretation by showing that PAH features are absent in the spectra of SMC and LMC massive star forming regions. However, the only ISO observation of an SMC quiescent molecular cloud shows all PAH features, indicating a PAH abundance relative to large dust grains similar to that of Milky Way clouds. We identified a reddened B2III star associated with this cloud. We propose to observe it with STIS. This observation will provide the first measure of the extinction properties of SMC dust away from star forming regions. It will allow us to disentangle the effects of metallicity and massive stars on the SMC extinction curve and dust composition and to assess the relevance of the SMC bump-free extinction curve to low metallicity and/or starburst galaxies in general.

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Proposal Category: GO
Scientific Category: STELLAR POPULATIONS
ID: 9719
Title: Search For Metallicity Spreads in M31 Globular Clusters
PI: Terry Bridges
PI Institution: Anglo-Australian Observatory

Our recent deep HST photometry of the M31 halo globular cluster (GC) Mayall~II, also called G1, has revealed a red-giant branch with a clear spread that we attribute to an intrinsic metallicity dispersion of at least 0.4 dex in [Fe/H]. The only other GC exhibiting such a metallicity dispersion is Omega Centauri, the brightest and most massive Galactic GC, whose range in [Fe/H] is about 0.5 dex. These observations are obviously linked to the fact that both G1 and Omega Cen are bright and massive GC, with potential wells deep enough to keep part of their gas, which might have been recycled, producing a metallicity scatter among cluster stars. These observations dramatically challenge the notion of chemical homogeneity as a defining characteristic of GCs. It is critically important to find out how common this phenomenon is and how it can constrain scenarios/models of GC formation. The obvious targets are other bright and massive GCs, which exist in M31 but not in our Galaxy where Omega Cen is an isolated giant. We propose to acquire, with ACS/HRC, deep imaging of 3 of the brightest M31 GCs for which we have observed velocity dispersion values similar to those observed in G1 and Omega Cen. A sample of GCs with chemical abundance dispersions will provide essential information about their formation mechanism. This would represent a major step for the studies of the origin and evolution of stellar populations.

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Proposal Category: GO
Scientific Category: GALAXIES
ID: 9720
Title: Age-dating Star Clusters in M101
PI: Rupali Chandar
PI Institution: Space Telescope Science Institute

M101 represents perhaps our best chance to study the stellar population of a luminous, late type spiral galaxy, due to both its proximity and its face-on orientation. For these reasons, 13 orbits of HST ACS observing time were allocated in Cycle 11 to obtain a 4x4 mosaic image of M101 in BVI . Unfortunately, a degeneracy between age and reddening exists when only these three bands are available. Hence, we propose to augment these observations by obtaining WFPC2 U band and ACS H alpha images. This will enable the accurate determination of ages for the young clusters, secure identifications of 75-100 old globular clusters, and allow a quantitative study of the HII region sizes and structures. Some of the specific questions we will address are: How do the young clusters form and evolve? What fraction of the clusters dissolve and on what timescales? Do clusters evolve with a continuum of properties? Using WFPC2 and ACS in parallel, and making use of the fact that M101 is in the CVZ, allows us to greatly enhance the science return of previous HST observations for the cost of only 4 orbits.
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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9721
Title: The Kinematics and Dynamics of the Material Surrouding Eta Carinae
PI: Bryan Dorland
PI Institution: United States Naval Observatory

We propose a series of observations using both WFPC2 and ACS/HRC instruments that will perform astrometric measurements of the ejecta around eta Car. We will observe ejecta in three distinct regions: the inner (characterized by the close-in debris such as the Weigelt blobs), the intermediate (primarily the equatorial disk), and the outer (the homunculus and the North and South Jet structures). The WFPC2 observations will provide second and third epoch measurements for previous WFPC2 data producing a significantly increased temporal baseline (with corresponding decreases in proper motion, date of origin and 3D orientation errors) and the third epoch observations will allow for the detection of acceleration and non-radial motion in the ejecta, testing the canonical hypothesis of ballistic motion. As WFPC2 decommissioning is fast approaching, we are also proposing a series of simultaneous ACS/HRC observations in order to provide a calibration link between the WFPC2 and HRC astrometric frames. We estimate that our proposed series of observations will require 10 total orbits with 7 dedicated to WFPC2 observations and 3 to ACS/HRC observations.
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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9722
Title: Life in the fast lane: The dark-matter distribution in the most massive galaxy clusters in the Universe at z>0.5

PI: Harald Ebeling
PI Institution: University of Hawaii

We propose two-filter ACS observations of a complete sample of 12 very X-ray luminous galaxy clusters at 0.5<z<z0.5. HST's
unique capabilities will allow us to: 1) measure accurately the clusters' dark matter distribution on scales from tens to more than 500/h_50 kpc from observations of strong and weak gravitational lensing, 2) use galaxy-galaxy lensing to measure the shape, extent, and mass content of the dark-matter halos of both cluster and field galaxies, and 3) study the color morphology of mergers and the star formation history of galaxies in a high-density environment. The proposed observations are complemented by Chandra observations of all our targets (all 12 awarded, 11 executed to date) which provide independent constraints on the dark matter and gas distribution in the cluster cores, as well a by extensive groundbased observations of weak lensing on yet larger scales, galaxy dynamics, and the SZ effect.
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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9723
Title: Deep NICMOS imaging of HDF-South: restframe optical morphologies of high redshift galaxies
PI: Marijn Franx
PI Institution: Universiteit Leiden

We have obtained ultra-deep Js, H, Ks imaging of the Hubble Deep Field South WFPC2 field with the VLT, in order to study high redshift galaxies. The Ks-band data are the deepest obtained to date in any field. We find that the population of Ks selected galaxies at z=2-4 in HDF-South differs in two important aspects from previous studies in HDF-North. First, we find several galaxies which are large and apparently regular in the rest-frame optical, with more complex rest-frame UV morphologies. These objects resemble large disk galaxies in the local Universe. Second, we have identified a population of galaxies with red J-K colors that are extremely faint in the rest-frame UV. The galaxies have ages of 0.5-2 Gyr and are highly clustered, and may be progenitors of nearby bulges and early-type galaxies. We propose to obtain a deep mosaic with the NICMOS/NIC3 camera in the H band, covering the WFPC2 field. The increased depth and spatial resolution of the NICMOS mosaic would allow us to determine the restframe optical morphologies of a large sample of high redshift galaxies, in order to study the relative distributions of young and old stars, to decompose the galaxies in bulges and disks, to measure scale lengths, and to model the stellar populations of the sub-components. The lack of large U-dropouts and red galaxies in HDF-North, and the need for larger samples call for the proposed imaging of HDF-South. We waive all prioprietary rights.
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Proposal Category: SNAP
Scientific Category: HOT STARS
ID: 9724
Title: Towards a global understanding of accretion physics - Clues from an UV spectroscopic survey of cataclysmic variables
PI: Boris Gaensicke
PI Institution: University of Southampton

Accretion inflows and outflows are fundamental phenomena in a wide variety of astrophysical environments, such as Young Stellar Objects, galactic binaries, and AGN. Observationally, cataclysmic variables (CVs) are particularly well suited for the study of accretion processes. We are currently carrying out a Cycle 11 STIS UV spectroscopic snapshot survey of CVs to fully exploit the diagnostic potential of these objects for our understanding of accretion physics. While the data obtained so far are of excellent quality, the number of targets that will be observed in Cycle 11 is too small for a statistically significant analysis (only 19 objects out of our 149 accepted Cycle 11 snapshot targets have been observed at the time of writing). We propose here to extend this survey into Cycle 12, building a homogenous database of accretion disc and wind outflow spectra covering a wide range of mass transfer rates and binary inclinations. We will analyse these spectra with state-of-the-art accretion disc model spectra (SYNDISK), testing our current knowledge of the accretion disc structure, and, thereby, providing new insight into the so far not well understood process of viscous dissipation. We will use our parameterised wind model PYTHON for the analysis of the radiation driven accretion disc wind spectra, assessing the fundamental question whether the mass loss rate correlates with the disc luminosity. In addition, our survey data will identify a number of systems in which the white dwarf significantly contributes to the UV flux, permitting an analysis of the impact of mass accretion on the evolution of these compact stars. This survey will triple the number of currently available high-quality accretion disc / wind outflow / accreting white dwarf spectra, and we waive our proprietary rights to permit a timely use of this database.
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Proposal Category: GO
Scientific Category: SOLAR SYSTEM
ID: 9725
Title: The Long-term Observational Record of Uranus' Atmosphere, its Rings, and its Satellites: the WFPC2-ACS Link
PI: Erich Karkoschka
PI Institution: University of Arizona

Recording the seasonal change of Uranus is a key to understand seasonal changes in atmospheres due to Uranus' high obliquity. The best record to date comes from WFPC2 imaging of Uranus since 1994. We propose to image Uranus simultaneously with similar filters in WFPC2 and ACS so that this record can be extended with future ACS observations. Without such an observation, the long-term record of WFPC2 images cannot be linked with any future images because of Uranus' steep spectral features. Observations of the Uranian rings over a wide range of sub-solar latitudes allow powerful constraints on physical parameters, such as separation between ring particles. Our proposed observations will provide the necessary link between previous WFPC2 images and future ACS images near the ring-plane-crossing of 2007. The same reasoning applies to images of Uranian satellites, where a consistent record over a wide range of sub-solar latitudes yields information about satellite shape and albedo distribution. Since Cycle 12 is the last Cycle of WFPC2, there will be no other chance for the proposed observations. The investment of only two orbits will significantly enhance the scientific value of the previous 45 WFPC2 orbits on Uranus. Only HST has the spatial resolution and photometric stability for these studies.
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Proposal Category: SNAP
Scientific Category: HOT STARS
ID: 9726
Title: A NICMOS search for obscured supernovae in starburst galaxies
PI: Roberto Maiolino
PI Institution: Osservatorio Astrofisico di Arcetri

Recent near-IR monitoring campaigns were successful in detecting obscured supernovae (SNe) in starburst galaxies. The inferred SN rate is much higher than that obtained in previous optical campaigns, but it is still significanly lower than expected by the high level star formation of these systems. One possible explanation for the shortage of SNe is that most of them occur in the nuclear region, where the limited angular resolution of groundbased observations prevents their detection. We propose NICMOS SNAP observations of a sample of starburst galaxies already observed once by NICMOS, with the goal of exploiting its sensitivity and angular resolution to detect nuclear obscured SNe which might have been missed by groundbased surveys. These observation will allow to assess the real SN rate in starbust galaxies and deliver a sample of SN occurring in the extreme environment of galactic nuclei. We expect to detect more than 55 SNe (if the whole sample is observed). If the number of SNe detected in the program is much lower than expected it would prompt for a revision of our understanding of the relation between the star formation rate and the SN rate.
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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9727
Title: Exploration of the SN Ia Hubble Diagram at z > 1.2
PI: Saul Perlmutter
PI Institution: Lawrence Berkeley National Laboratory

In the spirit of a Treasury proposal, we propose to organize, and deliver to the astronomical community, non-proprietary follow-up observations of ~10 Type Ia supernovae at 1<z<="" 100="" au.="" confirm,="" out,="" quantitative="" off-axis="" (wide-angle)="" flow="" time.="" understanding="" determines="" outflows="" disrupt="" natal="" cores,="" tests="" theories="" jet="" production="" collimation.="==========" snap="" 9786="" next="" generation="" spectral="" library="" michael="" gregg="" california="" -="" davis="" continue="" 10="" snapshot="" program="" 600="" modeling="" integrated="" light="" dispersion="" uv="" optical="" gratings="" stis.="" roughly="" equally="" divided="" four="" metallicities,="" ([fe="" h]="" lt="" -1.5),="" -1.5="" 0.5),="" near-solar="" -0.3="" 0.1),="" super-solar="" gt="" 0.2),="" well-="" sampling="" entire="" hr-diagram="" each="" bin.="" surpass="" extant="" compilations="" lasting="" archival="" value,="" well="" era.="" universal="" utility="" community-broad="" venture,="" waive="" proprietary="" period.="==========" circumstellar="" matter="" 9787="" monitoring="" polarization="" crab="" nebula="" jeff="" hester="" state="" changing="" moving="" wisps="" nebula.="" making="" wisps,="" fully="" radiation="" direction="" relative="" axis="" wisp.="" information="" hard-to-measure="" properties="" pitch-angle="" radiating="" particles,="" help="" models="" flow.="" more="" generally,="" add="" already="" rich="" observational="" legacy="" arguably="" single="" object="" astrophysics.="==========" 9788="" narrow-band="" luis="" ho="" carnegie="" washington=""

conduct="" comprehensive="" (h-alpha="" +="" [n="" ii])="" regions="" bulge-="" dominated="" (s0="" sbc)="" cover,="" angular="" extending="" over="" field,="" unprecedented="" representing="" many="" environments.="" applications="" problems="" interest,="" invaluable="" addition="" legacy.="" conducted="" mode,="" drawing="" targets="" complete="" 145="" palomar="" group="" primary="" applications.="" first,="" emission-line="" disks="" suitable="" future="" kinematic="" measurements="" stis,="" order="" better="" recently="" discovered="" relations="" bulge="" preliminary="" type="" must="" done,="" sooner="" or="" later,="" progress="" exciting="" field.="" second,="" issues="" related="" extragalactic="" systematically="" h="" ii="" super="" galactic="" scales,="" circumnuclear="" large-scale="" 9789="" distance="" pleiades="" christopher="" johns-krull="" rice="" despite="" importance="" astrophysics,="" open="" remains="" great="" dispute.="" main-sequence="" fitting="" 132.3="" 1.9="" pc,="" hipparcos="" average="" parallax="" pleaides="" member="" gives="" 116.4="" 2.9="" pc.="" believed,="" astrophysics="" dramatically="" incomplete.="" other="" hand,="" has="" measurement="" suffers="" systematic="" uncertainties="" discrepancy="" main-="" sequence="" technique.="" question="" remain="" performed.="" accuracy="" about="" 1.5%.="" resolve="" controversy="" once="" all.="==========" 9790="" separating="" activity="" tauri="" state,="" naked="" (non-accreting)="" (ntts)="" real="" proxies="" magnetically="" active="" classical="" tts="" (ctts)="" looks="" like.="" comparative="" allows="" ctts.="" addition,="" late-type="" ntts="" excellent="" studying="" rotation-activity="" relationships="" convective="" turbulent="" dynamos.="" limited="" currently="" available,="" appear="" higher="" than="" h-="" alpha="" x-ray="" flux="" ratios="" lower="" fluxes="" stars.="" hst-stis="" 11="" establish="" level="" structure="" dynamo="" generated="" young="" principal,="" far="" ultraviolet="" sensitive="" diagnostics="" ctts,="" shocks="" substantial="" 10^5="" 10^6="" k.="" imperative="" understand="" emissions="" before="" study="" hot="" 9791="" curing="" sw="" sex="" syndrome="" christian="" knigge="" southampton="" cataclysmic="" variables="" (cvs)="" outstanding="" laboratories.="" result,="" gleaned="" cvs="" shaped="" conceptual="" picture="" systems="" scales.="" particular,="" nova-like="" (nlcvs)="" long="" thought="" *the*="" classic="" examples="" standard,="" steady-state="" disks.however,="" nlcvs="" --="" remarkable="" clearly="" do="" not="" fit="" standard="" model.="" symptoms="" sw~sex="" syndrome,="" does="" least="" neutron="" binary="" system.="" existence="" throws="" serious="" doubt="" validity="" disk-accreting="" systems.="" vital="" uncover="" cause="" phenomenon.="" dw="" uma="" ideally="" suited="" achieve="" goal.="" located="" cvz,="" time-resolved,="" far-ultraviolet="" complete,="" consecutive="" orbits.="" resulting="" distinguishing="" competing="" models.="==========" 9792="" uncovering="" cv="" m15:="" deep,="" time-="" resolved,="" far-uv="" core="" carry="" out="" (fuv),="" time-resolved="" dynamically-formed="" (gc)="" m15.="" sbc="" 6="" epochs="" fuv="" filter,="" additional="" visits="" images="" nuv="" filters.="" crowding="" problem="" fuv,="" yield="" photometry="" core.="" census="" enough="" essentially="" ``broad''="" involve="" following="" characteristics:="" brightness;="" shape;="" civ="" heii="" emission;="" (4)="" short="" time-scale="" ($\sim$="" minutes)="" variability="" (flickering,="" wd="" spin);="" (6)="" hours)="" (orbital="" variations);="" (7)="" weeks)="" (dwarf="" nova="" eruptions).="" m15,="" exists.="" detect="" numerous="" stragglers="" white="" dwarfs,="" near="" finally,="" high-quality="" curves="" binaries="" cosmology="" 9793="" grism-acs="" (grapes)="" sangeeta="" malhotra="" grism="" wide="" ultradeep="" covers="" well-imaged="" goods="" chandra="" south="" deepest="" ultra="" observed="" cycles="" 12.="" extra-galactic="" will:="" robustly="" determining="" emitters,="" lyman="" break="" z~6,="" sources="" ionizing="" photons="" end="" "dark="" ages".="" similar="" photon="" needed=""

maintain="" achieved.="" finding="" contiguous="" holes="" low-luminosity=""
agns.="" star-formation="" assembly="" peak="" identifying="" lines,="" old=""
4000="" aa="" combination="" showing="" breaks.="" unbiased="" yet,=""
identification="" i="27." (5)="" enhance="" value="" multiwavelength="" udf=""
astronomical=""
community.="==========
========" 9794="" parameters="" hot,="" massive="" metallicity:="" o-stars=""
andromeda="" philip="" massey="" lowell="" ubiquitous="" phenomenon="" stars,=""
mass-loss="" effect="" evolution,="" lose="" half="" life.="" physics=""
radiatively-="" driven="" winds,="" simple="" theoretical="" parameterizations=""
properties,="" luminosity,="" effective="" temperature,="" gravity,=""
developed.="" good="" agreement="" rates="" scaling="" environments,="" where=""
solar,="" requires="" power-law="" z,="" various="" studies="" values=""
exponent="" ranging="" 0.5="" 1.0.="" hampered="" scant="" metallicities=""
covered="" database,="" extends="" one-third="" solar="" (smc)="" (milky=""
way).="" proposing="" extend="" o8-o8.5if="" (m31),="" measured="" hii="" twice=""
solar.="" ground-based="" time="" gone="" setting="" stage="" this,="" last=""
years="" throughput="" (thanks="" mama)="" aperture="" telescopes="" permitted=""
gathering="" quality="" low-metallicity="" magellanic="" cloud="" obtained=""
need="" newly="" reburbished="" 6.5-m="" mmt="" requesting="" provide.="" (teff,=""
log="" g,="" radius,="" mass,="" metallicity),="" compared="" lower-metallicity=""
counterparts.="" wfpc2="" useful="" ourselves="" others="" resolved="" like=""
own.="==========
==" 9795="" he-rich="" o2-3="" lmc:="" freakish="" relic="" paradigm="" shifter?=""
early,="" short-lived="" lives="" came="" across="" lmc="" shows="" no="" hei,=""
little="" star,="" suggesting="" object.="" were="" looking="" wolf-rayet=""
(wr)="" (hot="" he="" ratio)="" without="" characteristic="" lines---what=""
would="" see="" wr="" had="" wind.="" nothing="" makes="" sense.="" rule=""
obvious="" possibilities="" (composite="" spectrum,="" foreground="" dwarf).=""
orbit="" so="" examine="" look="" critical="" diagnostic="" lines;="" take=""
advantage="" narrow-slit="" (halpha="" hei="" 4471)="" free="" nebular=""
contamination.="" simply="" oddity,="" perhaps="" coalescence="" interaction,=""
greater="" significance.="" dozen="" ever="" observed,="" maybe="" telling=""
don't="" much="" thought.="" really="" ought="" up="" it's="" intriguing=""
peculiar="" something="" profoundly=""
interesting.="==========
==========" 9796="" candidate="" ultra-luminous="" jon="" miller="" (ulx)="" off-
nuclear="" point="" timescale="" days,="" weeks,="" signals="" ulxs="" accreting=""
sources,="" likely="" harboring="" holes.="" exceeds="" eddington="" limit=""
msun="" hole;="" counterparts="" objects.="" u-b-v-i="" exposures="" 4=""
extremely="" bright="" spirals:="" 1313="" x-1="" x-2,="" m81="" x-9=""
(holmberg="" x-1),="" m74="" x-1.="" 0.5''="" position,="" characteristics=""
consistent="" expectations="" obtain,="" magnitudes="" measure,="" source=""
(also,="" correlated="" optical-x-ray="" simultaneous="" snapshots)="" donor=""
(10="" 100-="" 1000="" msun),="" scenarios="" 9797="" pulsations="" psr=""
0656+14:="" thermal="" vs.="" nonthermal="" george="" pavlov="" pennsylvania=""
middle-aged="" pulsar="" 0656+14="" studied="" near-="" ir="" near-uv=""
wavelengths.="" indicates="" magnetospheric="" contributing="" radiation.=""
components="" detector="" wavelength="" 1150--1700="" aa,="" never="" observed.=""
combined="" previous="" pulsar,="" toward="" quantifying="" constraining=""
composition="" equation="" superdense="" interiors,="" acceleration=""
magnetospheres.="==========
============" 9798="" what's="" point?="" x-="" ray="" cas="" first-light=""
revealed="" enigmatic="" galaxy's="" youngest="" supernova="" remnant="" (sn=""
1680).="" lies="" 7="" arcsec="" remnant's="" expansion="" presumably="" unusual=""
9="" keck's="" detected="" positional="" error="" circle,="" appears="" star.=""
nir="" upper="" prove="" cannot="" ordinary="" companion.="" possibility=""

magnetar="" anomalous="" soft="" gamma-ray="" repeater.="" extinction="" offers="" counterpart.="" obtaining="" nic2="" band="" almost="" mags="" deeper="" searches="" 2="" realistically="" keck="" subaru.="" high-resolution="" potential="" confusion="" plane="" region.="" matching="" j="" (to="" 27.2="" mag)="" ultra-deep="" either="" counterpart="" hence="" nature,="" place="" severe="" source.="==========" ===== 9799="" r.="" los="" angeles="" clusters,="" primarily="" hinderred="" imaging.="" (3="" month="" period)="" onboard="" color-magnitude="" diagrams="" resoltuion="" vastly="" superor="" even="" color-="" diagrams.="" mesurement="" horizontal="" red="" giant="" branches="" reddening="" distance,="" derived.="" special="" interest="" contain="" oldest="" additionally,="" separation="" members="" contaminating="" give="" superior="" structural="" ground.="" especially="" concentrated="" cores;="" proximity="" center,="" experienced="" dynamical="" shocking.="" encounters="" capable="" modifying="" populations,="" probably="" effects.="" difficult,="" believe="" potentially="" part="" 9800="" tracking="" knotty,="" high-speed="" carbon="" v="" hydrae="" raghvendra="" sahai="" propulsion="" laboratory="" experiencing="" heavy="" loss="" undergoes="" agb="" pre-planetary="" possibly="" earliest="" brief="" phase.="" molecular="" bipolar="" established="" stage.="" hst,="" high-velocity="" (=""> 200 km/s) jet or blob of gas
which was ejected only ~2 years ago from near the star. A second STIS observation 11 months later clearly showed both its proper motion and the fact that it is being strongly decelerated. We propose STIS monitoring of this remarkable event for an additional 3 years, in order to: 1) obtain a precise dynamical and cooling history of this blob, and 2) determine whether the ejection of such blobs is associated with, or perhaps phased with, the 530-day stellar period. This ejection event is likely to hold the key to understanding why initially spherical mass outflows adopt a bipolar geometry during the post-AGB phase of stellar evolution. We not only have the opportunity to look on as the circumstellar envelope is sculpted by this and perhaps other collimated mass ejections, but we also have an unprecedented chance to constrain the mechanism for mass ejection, and thereby help solve a long-standing puzzle. Finally, molecular line observations and our previous STIS Hα observations show that the V Hya system contains a prominent, central disk. We propose a follow-up study in Hα in order to better define the disk properties, and thereby to determine whether the disk plays a role in the collimation of the emerging blob. We will use the data to constrain hydrodynamical models of collimated jet interactions with the ambient circumstellar medium in V Hydrae, in order to set quantitative constraints on the physical properties of the blobby outflow.
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Proposal Category: SNAP
Scientific Category: COOL STARS
ID: 9801
Title: Are OH/IR Stars the Youngest post-AGB stars? A NICMOS Imaging Survey
PI: Raghvendra Sahai
PI Institution: Jet Propulsion Laboratory

Essentially all well-characterized preplanetary nebulae (PPNe) -- objects in transition between the AGB and planetary nebula evolutionary phases - are bipolar, whereas the mass-loss envelopes of AGB stars are strikingly spherical. In order to understand the processes leading to bipolar mass-ejection, we need to know at what stage of stellar evolution does bipolarity in the mass-loss first manifest itself. We have recently hypothesized that

most OH/IR stars (evolved mass-losing stars with OH maser emission) are very young PPNe. We are conducting a multiwavelength survey program of imaging and spectroscopic observations of such objects, using a large, morphologically unbiased sample selected using IRAS 12-to-25 micron colors. Our ongoing HST/SNAP imaging survey of the optically bright half of this sample with WFPC2 and ACS is highly succesful: 19/32 objects observed are extended with bipolar/multipolar shapes (remaining objects are unresolved). Slightly more than 50% of our sample are optically too faint or undetected but have strong near-IR counterparts -- we therefore propose a NICMOS SNAPshot imaging survey of these optically-faint OH/IR stars. These observations are crucial for determining how and when the bipolar geometry asserts itself. The results from our NICMOS survey (together with the WFPC2/ACS survey) will allow us to draw general conclusions about the onset of bipolar mass-ejection during late stellar evolution. Our complementary program of interferometric mapping of the OH maser emission in our sources is yielding kinematic information with spatial resolution comparable to that in the HST images. The HST/radio data will provide crucial input for theories of post-AGB stellar evolution. In addition, these data will also indicate whether the multiple concentric rings, "searchlight beams'', and truncated equatorial disks recently discovered with HST in a few PPNe, are common or rare phenomena.

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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9802
Title: The Properties of Highly Ionized High Velocity Gas in the Distant Galactic Corona and Local Group
PI: Kenneth Sembach
PI Institution: Space Telescope Science Institute

We propose to observe two bright AGNs (NGC7469 and Mrk 335) with the E140M grating of STIS to study the properties of highly ionized high velocity O VI absorption systems associated with the Magellanic Stream and several Local Group clouds. Unlike most high velocity cloud studies, we know that these absorbers are located at large distances from the Sun. The observations will allow us to perform detailed studies of the ionization properties of the O VI absorbers and discriminate between competing models for the production of the highly ionized gas. We will analyze the component velocity structure of the absorption to quantify the relationship of the highly ionized gas and the neutral gas in this region of the sky, and determine if the properties of the high velocity gas are consistent with an origin in interfaces between warm clouds and a low-density hot (T > 10^6 K) Galactic corona or Local Group medium. The results of this investigation are directly relevant to studies of high velocity clouds, the production of hot gas associated with galaxies, the intergalactic medium, and the formation and evolution of galaxies. Secondary science programs that will be undertaken with the proposed observations include a study of the Galactic halo, analysis of the intergalactic absorption along the sight lines, and an investigation of the intrinsic AGN absorption in NGC 7469.

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Proposal Category: GO
Scientific Category: GALAXIES
ID: 9803
Title: Deep Near IR Images in the Chandra Deep Field South Ultra Deep Field
PI: Rodger Thompson

PI Institution: University of Arizona

The ACS Ultra Deep Field (UDF) images will greatly enhance the rich suite of deep multi-wavelength images in the Chadra Deep Field South (CDF--S). We propose to complete the image set with deep near IR NICMOS images at 1.1 and 1.6 microns over a significant fraction of the UDF, providing a critical link between the HST ACS and SIRTF observations. The timely addition of the near IR images insures that investigators will have images that span the spectrum from x-ray to far IR. In recognition of the value of the near IR images this proposal is submitted as a Treasury proposal with no proprietary period. The proposal team will deliver science quality images, mosaiced images covering 4.9 sq arc min, and a photometric catalog complete to an AB mag. of 28.2 in both the F110W and F160W filters. The program also delivers a parallel extremely deep ACS field, 8' away, that reaches to within 0.6 mag of the UDF in the same filters as the UDF. The scientific program of the proposal team focuses on the star formation history of the universe, evolved galaxies at high redshift, galaxies at the epoch of reionization, and the redshift evolution of AGNs and ULIRGs. The HDF-N is currently the only field with spatially-coincident deep HST imaging in both the optical and near infrared. The small size of the HDF-N means that large scale structure is the dominant error in the results from the HDF-N. Providing observations in a field that is spatially uncorrelated is critically important. The UDF/CDF-S fulfills that goal. The depth of the UDF ACS imaging, and the wealth of Great Observatory and ground based observations in the CDF-S, make these NICMOS observations uniquely valuable. An extraordinarily rich array of science opportunities await the community from the NICMOS UDF data. .

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Proposal Category: GO
Scientific Category: COOL STARS
ID: 9804
Title: Experimental Proof of the Neutrino Process in SN from Boron Isotope Measurements
PI: Douglas Duncan
PI Institution: University of Colorado at Boulder

The light elements Li, Be, and B are formed in the Big Bang (Li) and by cosmic ray (CR) spallation. But the abudance of 11B has never been satisfactorily explained: 11B/10B in the solar system is 4.0, CR spallation predicts 2.5. There needs to be another source of 11B. Woosely et al. (1990) predict the large flux of neutrinos in Type II supernovae will sythesize elements, including converting 12C to 11B. This "neutrino process" has never been experimentally verified. A "smoking gun" would be to find a metal poor star whose elements came primarily from Type II SN and whose B is pure 11B -- only the neutrino process could produce that. In a previous cycle we obtained STIS measurements of a metal poor star and were able to clearly show that 11B/10B >= 4. We now ask for additional observations of higher S/N, which can distinguish if 11B/10B = 4, or if the mix is pure 11B. In either case we will end up with a precise measure of how much 11B in old stars is NOT produced by CRs, and likely due to SN, and can place a new constraint on the temperature and density of SN models in the region where neutrino-induced nucleosynthesis is thought to take place. Although this test could be made in a single star, we ask to observe two, to increase the confidence in what is a subtle isotopic measurement. We propose to observe the brightest two suitable metal poor stars. One is in the CVZ.

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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9805
Title: OGLE-TR-56b: The Most Interesting Transiting Planet
PI: Dimitar Sasselov
PI Institution: Harvard University

Our team has recently succeeded in confirming spectroscopically the discovery of the first extrasolar giant planet found in a transit search: OGLE-TR-56b. Its main parameters are: mass = 0.9 Jupiters, size = 1.3 Jupiters. Thus, OGLE-TR-56b appears to be similar to HD 209458b, the only other known transiting giant planet. Unfortunately, our planet radius determination is uncertain due to the very limited precision of the ground-based photometry, and does not allow for a meaningful comparison with theoretical model predictions. We propose HST observations with the ACS-HRC of the main transit of OGLE-TR-56b, which will improve the precision and the accuracy of the planet parameters by close to a factor of 10. In addition, we propose a timing experiment for the planet's extremely close orbit (1.2-day period, 0.023 AU from the star), which will allow us to detect the orbital decay and test convection theories. We propose similar transit observations for two other candidates identified in our spectroscopic survey (OGLE-TR-10 and OGLE-TR-58) to improve their physical parameters. Finally, we propose to observe also the secondary eclipse of OGLE-TR-56b, when the planet passes behind its star. This will enable us to determine its albedo and will allow to constrain extrasolar planet atmosphere models.
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Proposal Category: GO
Scientific Category: QUASAR ABSORPTION LINES AND IGM
ID: 9806
Title: Properties of the Intergalactic Medium near the Epoch of HeII Reionization
PI: Wei Zheng
PI Institution: Johns Hopkins University

Our STIS spectral snapshot programs have found a rare case of a HeII Lyman-alpha absorption trough in a z=3.51, V=17.6 quasar. This is the highest redshift at which this feature has been observed. We propose to obtain a high-quality STIS spectrum that will enable us to (1) Investigate the evolution and properties of the intergalactic medium (IGM) over an epoch between z=2.8 and 3.5; (2) Search for signs of the reionization of the intergalactic helium; (3) Measure the intensity of the UV background radiation, and find clues toward its origin; and (4) Estimate the IGM baryonic density.
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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9807
Title: Rotation in Jets from Young Stars: investigating NUV lines with very high Spectral Resolution
PI: Francesca Bacciotti
PI Institution: Osservatorio Astrofisico di Arcetri

Optical STIS spectra of the jets from DG Tau, RW Aur, TH 28 and LkHa 231 obtained by us (prop IDs. 7311, 9435) show systematic transverse radial velocity shifts in the region where the flow has just been accelerated and

collimated (Bacciotti et al, 2002, 2003b), i.e. within about 100 AU from the source. We interpret such shifts as evidence for jet rotation. Whether YSO jets rotate is a fundamental question in star formation because it has been suggested that jets might be the way excess angular momentum is removed from the star/disk system, thereby allowing the star to accrete. In particular it is important to know if observed toroidal velocities are in agreement with predictions of magneto-centrifugal jet launching models. The limited spatial and spectral resolution of STIS in the optical however, only allows one to say qualitatively that the observed rotational velocities are in rough agreement with theory. Moreover only the resolved peripheral regions of the flow can be studied. We are proposing here to exploit the higher spatial and spectral resolution of STIS in the NUV to measure transverse jet velocity profiles.This is a task which can only be undertaken by the HST and which is ideally suited to the STIS (see text). To measure the velocity profiles, we will observe the Mg II doublet at 2800 Angstrom (using the E230M echelle and the 6 X 0.2 slit transverse to the flow). In comparison to the optical, the NUV affords us double the spatial resolution and we will be able to detect velocity differences across the jet down to 2 km/s. Not only should we be able to determine for the first time the detailed rotational velocity profile across a jet but we also expect to spatially resolve the high velocity axial core of the jet in the NUV. Finally we add that as very few NUV observations of the initial jet beam of YSO jets are available, our datasets should be a valuable contribution to the HST archive.
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Proposal Category: GO
Scientific Category: HOT STARS
ID: 9808
Title: Observing the Next Nearby Supernova
PI: John Bahcall
PI Institution: Institute For Advanced Study

If a neutrino-producing supernova (SN) explodes in the Galaxy, the Large or Small Magellanic Clouds, or a close member of the Local Group, it will be detected first by operating neutrino experiments: Super-Kamiokande, SNO, MACRO, and AMANDA. The supernova neutrino early warning system will notify photon observers throughout the world within an hour of the neutrino detection. Although the per-year probability of observing a neutrino SN (within 100 kpc) is small, the detection would be importantly scientifically and of widespread interest. The optical counterpart could be much brighter than normal extragalactic SNe. A bright nearby supernova detected by other means would also be of great interest and should activate this proposal. We propose unique STIS ultraviolet spectroscopic observations to measure the principal metallic lines, and hence the composition, velocity, and physical state, of the outermost atmosphere of the exploded star. In addition, we propose narrow- and broad-band imaging to provide information about the stellar environment and early morphology unobtainable from the ground. The data, especially images, will be valuable for public outreach and will be released immediately by NASA.
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Proposal Category: GO
Scientific Category: SOLAR SYSTEM
ID: 9809
Title: Saturn's rings and small moons on the eve of Cassini
PI: Richard French
PI Institution: Wellesley College

We propose to continue our long-term survey of Saturn's rings and small moons to obtain a coherent set of high resolution, multi-color WFPC2 images of Saturn and its rings during the final year before the arrival of the Cassini spacecraft at Saturn in mid-2004. Our Cycle 6-11 programs (6806, 7427, 8398, 8660, 8802, and 9341) explored the rings from their nearly edge-on aspect (southern hemisphere spring) to summer solstice in late 2002. We now propose to take advantage of the especially favorable viewing geometry of Cycle 12 to obtain UBVRI, F255W, and methane-filter PC images of the rings, small moons, and planet at the lowest phase angle (0.07 degrees) observable to date. A key goal is to measure for the first time the expected sharp spike in the opposition brightness of the rings and small moons, which will characterize the structure and particle properties of the rings and the surfaces of the satellites. We will also follow the chaotic behavior of Prometheus and Pandora, two small moons which may be perturbing each other gravitationally. Here, our goals are to catch the satellites in the act of any new coupled motions and to determine the changes in semimajor axis, eccentricity, and orbital inclination of the moons resulting from their most recent large chaotic interaction in 2000. This will complete our continuous WFPC2 coverage of these moons from 1994 until mid-2004, when Cassini's cameras will at long last surpass the capabilities of the HST. The Cycle 12 observations will also enable us to determine zonal winds and regional variations in Saturn's atmosphere prior to Cassini's arrival.

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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9810
Title: Accurate and Robust Calibration of the Extragalactic Distance Scale with the Maser Galaxy NGC4258
PI: Lincoln Greenhill
PI Institution: Smithsonian Institution Astrophysical Observatory

The extragalactic distance scale (EDS) is defined by a comparison of Cepheid Period-Luminosity (PL) relations for nearby galaxies and the LMC, whose uncertain distance is thereby the SOLE anchor. Studies of maser sources orbiting the central black hole in the galaxy NGC4258 have provided the most accurate extragalactic distance ever (7.2+/- 0.5Mpc). Since this distance is well determined and based on GEOMETRIC arguments, NGC4258 can provide a much needed new anchor for the EDS. We propose multi-epoch BVIH observations of NGC4258 in order to discover about 100 Cepheids and to characterize their light curves with 2-3 times greater accuracy than was previously possible with WFPC2. At 90 orbits (48 in Cycle 12; 42 in Cycle 13), this is a relatively large program. However, the result will have a major impact on the EDS, and substantial attention must be paid to characterization and minimization of systematic errors, as from metallicity, crowding, and blending. The resulting dataset will be the most complete for Cepheids in any galaxy yet studied with HST. In an ongoing NASA-funded program (OSS-SARA), we are using new analysis techniques and radio data to reduce uncertainty in the geometric distance to < 3% (0.07 mag). With this improved geometric distance and the BVIH data, we will be able to calculate the zero point of the PL relation ROBUSTLY to <4% (0.09 mag).

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Proposal Category: GO
Scientific Category: STELLAR POPULATIONS
ID: 9811

Title: Establishing the Metallicity Distribution in Normal Giant Ellipticals
PI: William Harris
PI Institution: McMaster University

NGC 3377 and 3379, the Leo Group ellipticals at d=11 Mpc, are the nearest E galaxies commonly regarded to be structually"normal", and as such, they are keystone objects for understanding the evolution and early star formation history of large ellipticals. The ACS/WFC camera now gives us the ability to obtain the metallicity distribution function (MDF) of their stellar population by direct resolution and photometry of their halo stars. To do this, we will follow the same highly successful techniques we have previously used for NGC 5128 with WFPC2 (V,I) imaging: the (V-I) colors of the brightest red-giant stars are highly sensitive to metallicity, and their locations in the color-magnitude diagram can be used for direct construction of the MDF. This will be a major step forward to understanding the formation history of these cosmologically dominant galaxies.

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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9812
Title: Ultraviolet Emission from Protostellar Accretion Disks
PI: Patrick Hartigan
PI Institution: Rice University

We propose to obtain ACS/prism observations of the UV continuum emitted by protostellar accretion disks. By combining the ACS data with simultaneous ground-based optical spectra and near-IR photometry, we will be able to observe the entire spectral energy distribution of the young stars and their disks from 1800A to 3.5um. The combined data set will solve the long-standing problem of degeneracy between reddening, spectral type, and excess emission in the analysis of such spectra by allowing us to measure reddenings directly from the 2175A bump, bolometric corrections from the UV continuum, and effective temperatures from the optical spectra. With this information in hand it will be possible for the first time to quantify the mass accretion rates, stellar radii, masses, and ages without the systematic uncertainties that have plagued previous efforts. The new data will probe the physical conditions that exist where material from the disk falls onto the star, such as filling factors, temperatures, and optical depths. We will also be able to place heavily veiled stars unambiguously in HR diagram for first time to see if these stars are on average younger than their more slowly accreting counterparts, and test whether or not the Mg II 2800A doublet traces jets close to their stars. The proposed observations will yield the first simultaneous coverage over all the principal wavelengths that these accretion disks emit; a true multiwavelength approach is the only way to clarify what goes on in accretion/outflow systems, a process common throughout astrophysics.

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Proposal Category: GO
Scientific Category: HOT STARS
ID: 9813
Title: Microquasars: Outbursts and Outflows in Black Hole Accretion Flows
PI: Carole Haswell
PI Institution: Open University

UV observations of an X-ray bright microquasar will be made with STIS. This is part of an extensive multiwavelength target of opportunity program. These observations provide an unrivalled opportunity to obtain high quality data from an accreting black hole. We will perform detailed quantitative tests of models for outbursts. We will test our picture of irradiated and warped disk evolution, and search for evidence of outflows and anomalous abundances using UV resonance lines. The spectral energy distribution and the rapid UV variability will reveal signatures of a truncated disc if present. Such truncated discs with hot, inefficiently radiating inner accretion flows have been implicated in relativistic jet production.
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Proposal Category: GO
Scientific Category: AGN/QUASARS
ID: 9814
Title: The Nature of the UV Excess in the Jet of 3C273
PI: Sebastian Jester
PI Institution: Fermilab

We propose to obtain a 3-orbit far-ultraviolet exposure of 3C 273's jet with ACS/SBC. Combining this with our existing and HST data, we will determine the spectrum of the UV excess emission from this jet. Hence, we will establish whether the UV excess is of common origin with the jet's X-rays. This jet has long served as a test case for all extragalactic jets, as it is both long (over 20 arcsec) and bright. Our request for additional observations is motivated firstly by our VLA/HST study of the jet in 3C 273. It has provided evidence for distributed particle acceleration and a hardening of the radio-UV spectrum towards the UV, caused by a UV-excess emission component of unknown origin. Secondly, the X-ray emission mechanism for this jet remains unclear even with the well-resolved Chandra imaging. The proposed data will tell whether these two issues are related. If they are, as we predict, then we can study the X-ray emitters at the HST's full resolution using the proposed observations.
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Proposal Category: GO
Scientific Category: STELLAR POPULATIONS
ID: 9815
Title: The Bottom of the Main Sequence in the Old, Metal-Rich Cluster, NGC 6791
PI: Ivan King
PI Institution: University of Washington

We propose a photometric study of the lowest part of the main sequence of NGC 6791, an old, rich open cluster whose metallicity is considerably higher than solar. The cluster is rich enough that a single ACS/WFC field will have ample stars for the study. For the faintest stars, proper-motion separation of cluster from field is essential; hence we include Cycle 14 observations. These should give us a color-magnitude diagram and luminosity function that reach into the region of the hydrogen-burning limit, thus extending the study of the latter into a new domain of metallicity. Observational data of this type will allow theoreticians to check many aspects of their theories of stellar structure. We also expect to see the white dwarf sequence of the cluster. Our team has experience with studies of this type, and has provided the geometric-distortion calibration of ACS.
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Proposal Category: GO
Scientific Category: GALAXIES
ID: 9816
Title: Proper motion kinematics in Galactic bulge/bar fields
PI: Konrad Kuijken
PI Institution: Universiteit Leiden

With this proposal we continue a succesful programme to measure proper motions in fields in the galactic bulge. We are able to reach accuracies of ca 10km/s in transverse motion at a distance of 8kpc, for thousands of stars per WFPC2 field. In combination with VLT spectroscopic radial velocities and metallicity indices, we will be able to construct a full dynamical and stellar-population model for our Bulge. Previous fields in this programme were on the minor axis; the fields proposed here (using first epoch observations from 1995-1998 from the archive) lie in the first quadrant, on the near side of the Galactic bar. We also wish to establish first-epoch observations in the 4th quadrant, where no suitable data exist so far.
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Proposal Category: GO
Scientific Category: GALAXIES
ID: 9817
Title: The mass of the Milky Way: orbits for Leo I and Leo II
PI: Konrad Kuijken
PI Institution: Universiteit Leiden

Constraining the mass of the galaxy at large radii remains a difficult problem. Available data are still rather scarce, and orbits of even a few objects at large radii can have a large impact. We propose to obtain proper motions for the two satellites Leo I and Leo II, which orbit the Galaxy at about 200kpc. Together with the radial velocities of these galaxies, which are well-known, the proper motions allow space velocities to be constructed: these can remove significant uncertainty in the Galactic mass models, and in particular settle the vexed question whether Leo I is gravitationally bound to the Galaxy or not.
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Proposal Category: GO
Scientific Category: AGN/QUASARS
ID: 9818
Title: Reverberation Mapping of the Least Luminous Seyfert 1 Galaxy NGC 4395
PI: Ari Laor
PI Institution: Technion-Israel Institute of Technology

We propose to make a short UV and optical reverberation mapping monitoring of NGC~4395, by far the least luminous Seyfert 1 galaxy known (M_B~ -10), where the Broad Line Region (BLR) is most likely between a fraction of a light hour to a few light hours across. This program will: 1. extend by a factor of ~100 the range of R_BLR probed by RM, 2. allow to test models for AGN continuum emission and BLR structure at very low L and M_BH. 3. provide significantly more reliable estimates of its M_BH than currently available, 4. allow to probe the M_BH-sigma_* relation in AGN at very low M_BH, which cannot be probed by other methods. Existing archival FOS observations indicate significant (up to 30-40%) line and continuum variations within one orbit, suggesting that the proposed RM is likely to succeed. The unusually small

R_BLR in NGC 4395 implies that RM can be performed here at only a fraction of the cost required in typical AGN.
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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9819
Title: The Physical Character of the Smallest-Scale Interstellar Structures
PI: James Lauroesch
PI Institution: Northwestern University

The origin(s) of interstellar structure recently seen on very small (tens of AU) scales is a puzzle that has inspired a number of possible theoretical interpretations. In particular, fluctuations in density and/or ionization fraction which can arise naturally in a turbulent medium may give rise to the observed structure. We propose to use STIS to accurately measure and compare selected interstellar absorption line profiles toward two binary star systems to test specific predictions of these models. In addition to NaI line profile variations between the stars indicative of structure on scales of ~2000 to 5000 AU, one member of each system shows temporal (proper motion induced) variations in one component indicative of structure on scales of ~20 AU. Such temporally variable components allow one to explore the structure of the interstellar medium on the smallest scales, and a detailed physical understanding of these structures requires the diagnostic power of the many interstellar species observable in the ultraviolet. By re-observing the HD 32039/40 system we will be able to confirm or invalidate our (turbulence inspired) model for the origin of this particular temporal fluctuation. The HD 36408AB system will allow us to study two locations near the edge of an individual cloud, and provide a new understanding of the surface layers of interstellar clouds.
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Proposal Category: GO
Scientific Category: STELLAR POPULATIONS
ID: 9820
Title: SagDIG: a benchmark for understanding star formation in extreme low-metallicity galaxies
PI: Yazan Momany
PI Institution: Universita di Padova

A long-standing question in the field of galaxy evolution is whether metal-poor star-forming galaxies (like I ZW 18) posses a very old (>10 Gyr) stellar population. An excellent example of such a primordial galaxy is the Sagittarius dwarf irregular (SagDIG). Besides being very metal-poor, this object is exceptionally rich in atomic gas and shows evidence of propagating star formation. Such features make of SagDIG and ideal target for the study of star formation and its triggering mechanism in extremely metal-poor environments. The deep, wide-field imaging capability of ACS is able to detect an unprecedented number of the oldest stellar population. Such data will enable the construction of both the star formation and chemical enrichment history. In particular, determining the epoch of formation of the first stars in such objects places a constraint on heirarchical galaxy formation in "bottom up" cosmologies.
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Proposal Category: SNAP
Scientific Category: STELLAR POPULATIONS
ID: 9821
Title: The Second Parameter Effect in Metal-Rich Globular Clusters: A Snapshot Study of NGC 6388
PI: Barton Pritzl
PI Institution: National Optical Astronomy Observatories, AURA

While it has long been known that at least one parameter besides the metallicity, [Fe/H], determines the horizontal branch (HB) morphology of Galactic globular clusters (GCs), our ignorance as to the nature of this second parameter (or parameters) has been a major stumbling block in understanding the formation history and age of the GC system. The hot HB populations recently discovered by HST in the metal-rich GCs NGC 6388 and NGC 6441 provide a unique opportunity for unraveling this second-parameter effect. Many different theories have been proposed to explain the pronounced upward slope of the HBs in these GCs, including stellar rotation, metallicity spread, and a dwarf galaxy origin. We propose to test these theories by obtaining B, V, I time-series photometry of the RR Lyrae variables in the core of NGC 6388 in order to determine whether, as predicted, the pulsation periods are unusually long due to a high HB luminosity. If confirmed, this would argue against age or mass loss as the second parameter in NGC 6388 and, more generally, would have implications for the use of RR Lyrae stars as standard candles for determining GC distances and ages. Light curves will also be obtained for the crowded Population II Cepheids near the core of NGC 6388, the most metal-rich GC, along with NGC 6441, known to contain such stars. We waive proprietary rights to any data obtained.

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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9822
Title: The COSMOS 2-Degree ACS Survey
PI: Nicholas Scoville
PI Institution: California Institute of Technology

We propose a 2 square degree imaging survey (Cosmic Evolution Survey -- COSMOS) with ACS in the I (F814W) and g (F475W) bands of the VIMOS-GTO equatorial field. This wide field survey is essential to understand the interplay between Large Scale Structure (LSS) evolution and the formation of galaxies, dark matter and AGNs and is the one region of parameter space completely unexplored at present by HST. The equatorial field was selected for its accessibility to all ground-based telescopes and low IR background and because it will eventually contain ~100,000 galaxy spectra from the VLT-VIMOS instrument. The imaging will detect over 2 million objects with I > 27 mag (AB,10 sigma), over 35,000 Lyman Break Galaxies(LBGs) and extremely red galaxies out to z ~ 5 and ~100 SNIa at z ~ 1. COSMOS is the only HST project specifically designed to probe the formation and evolution of structures ranging from galaxies up to Coma-size clusters in the epoch of peak galaxy, AGN, star and cluster formation (z ~0.5 to 3). The size of the largest structures necessitate the 2 degree field. Our team is committed to the assembly of several public ancillary datasets including the optical spectra, deep XMM and VLA imaging, ground-based optical/IR imaging, UV imaging from GALEX and IR data from SIRTF. Combining the full-spectrum multiwavelength imaging and spectroscopic coverage with ACS sub-kpc resolution, COSMOS will be Hubble's ultimate legacy for understanding the evolution of both the visible and dark universe.

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Proposal Category: GO
Scientific Category: SOLAR SYSTEM
ID: 9823
Title: Rings of Uranus: Dynamics, Particle Properties and Shepherding Moons
PI: Mark Showalter
PI Institution: NASA Ames Research Center

We propose to image the rings and small inner satellites of Uranus using the High Resolution Channel of the ACS. The revolutionary capabilities of the ACS will allow us to address a variety of important questions relating to ring properties and ring-moon interactions. Observations at a range of wavelengths and phase angles will reveal the opposition surges of these rings and moons, providing information on color and surface structure. Measurements of the ring in front of the planet will provide complementary information on optical depth; any variations of optical depth with wavelength will reveal the rings' poorly-constrained population of embedded dust. The rings of Uranus are closing rapidly as the planet approaches equinox in 2007, an event that takes place only every 42 years. Using this opportunity, our observations will be repeated at different solar and terrestrial tilt angles; this sequence of images will be particularly valuable for constraining the physical thickness and packing density of the rings. We will place particular emphasis on the rotational variations of the Epsilon Ring, whose radial width (and therefore its packing density) varies by a factor of five. In addition, a set of deep exposures targeted just off the planet will enable us to detect any 4-5 km moons embedded within the ring system. Dynamicists invoke numerous such moons to "shepherd" the many sharp ring boundaries, so this will serve as a definitive test of the theory.
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Proposal Category: SNAP
Scientific Category: GALAXIES
ID: 9824
Title: NIC3 SNAPs of nearby galaxies imaged in the mid-UV: the remarkable cool stellar population in late-type galaxies.
PI: Rogier Windhorst
PI Institution: Arizona State University

We propose a NIC3 H-band (F160W) SNAPshot survey of 48 nearby mid- to late-type galaxies covering all inclinations. In Cycle 9 and 10, we imaged ~100 galaxies in the mid-UV (F300W/F255W) and I-band (F814W) with WFPC2, and obtained UBVR CCD surface photometry from the ground. Early-mid-type galaxies show the usual small radial color-gradients, where disks become somewhat bluer at larger radii. But, remarkably, the majority of (lower luminosity, smaller and rounder) late-type galaxies shows the opposite trend and becomes redder outwards in all filters. While young UV/blue-bright stellar populations dominate their inner morphology, most late-type galaxies must have a significant halo or thick disk of older stars. Combining our proposed NIC3 H-band with existing WFPC2 images will span the wavelength range 0.29-1.6 micron at resolutions of 0.04-0.16" (FWHM). This Panchromatic Nearby Galaxy Atlas will be applicable to a wide range of problems, and will be made public immediately. Our NIC3/F160W science goals are to: (1) Establish the nature of the old outer stellar population. All target galaxies have $z<0.005$, allowing us to resolve any luminous, cool supergiant population. NIC3 is essential to make a pixel-to-pixel color-magnitude study of the nature, distribution and

uniformity of the outer stellar populations, which will constrain dwarf galaxy formation theories. (2) Determine galaxy structure at 5-20 pc resolution, tracing the old stellar population and mass distribution compared to the star-forming regions seen in the mid-UV. A range of inclinations is needed to distinguish between old thick disks or halos in late-type galaxies. (3) Make a multi-wavelength pixel-to-pixel decomposition to help delineate the effects of dust, age, and metallicity. Since we must cover a range of inclinations, NIC3 H-band is essential to map the effects from dust, and see how these may affect the studies of (1) and (2).
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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9825
Title: An ACS/WFC H-alpha Survey of the Orion Nebula
PI: John Bally
PI Institution: University of Colorado at Boulder

We propose to survey nearly 500 square arcminutes of the Orion Nebula in H-alpha using the ACS/WFC, increasing the sky coverage by an order of magnitude over the sum of all previous HST observations. This survey will, for the first time, sample the majority of young stars and circumstellar environments in the extended Trapezium cluster of 2,000 low-mass stars. Our primary goal is to determine the survival rate and statistical properties of protoplanetary disks in the type of radiation field and dynamical environment in which most stars are born. The survey will be used to search for new silhouette disks, bright proplyds, microjets, large-scale outflows, and to characterize the properties of these objects as a function of location in the nebula. We will determine accurate proper motions in regions where previous HST data exist. However, 90% of our fields will be observed with HST for the first time. This survey will provide the first complete census of pre-main sequence objects and outflows in an HII region and will constrain the extent of hazards to planet formation in such environments. The images will also provide a legacy for future stellar and nebular variability studies and proper motion measurements by providing a first epoch data base.
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Proposal Category: GO
Scientific Category: HOT STARS
ID: 9826
Title: The Planetary Nebula K648 in the Globular Cluster M15
PI: Luciana Bianchi
PI Institution: The Johns Hopkins University

We propose STIS spatially resolved UV spectra (long slit), and echelle UV spectra, of the Planetary Nebula (PN) K648 in M15, one of the few PN known in globular clusters. The data will provide two crucial tests to clarify the still elusive nature of this object, in particular whether it evolved from a coalesced binary (Bianchi et al. 2001). Such a result would have general implications for better understanding the evolution of close binaries (common envelope phase), especially important in the globular cluster environment, and the formation of bi-polar nebulae. We will try to reveal the presence (and dimensions) of a disk surrounding the central star by modeling the high resolution profile of the CIV wind line. The stellar parameters (and possible disk presence) can be constrained only by the requested STIS spectra. Complementary FUSE spectra in the far-UV (905-1187A) will be analysed concurrently, to derive the circumstellar molecular and neutral hydrogen, and

the extinction.
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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9827
Title: UV extinction by dust in unexplored LMC environments
PI: Luciana Bianchi
PI Institution: The Johns Hopkins University

The ensemble of results from studies of the UV extinction in the Milky Way, Magellanic Clouds (MC), M31 and M33, indicates a complex dependence of the dust properties with environment, where starburst activity and metallicity are relevant factors. Work in the LMC to date, based on IUE data, has several drawbacks: a) only supergiants could be used, b) they all have moderate extinction, c) the IUE S/N is limited, d) the large IUE slit may include light from other sources, such as scattered light from dust or faint companion stars, e) studies are confined to few (extreme) environments. We propose to obtain UV extinction curves more accurate than previous ones (from STIS spectra of main sequence stars with higher reddening), sampling four environments in the LMC with different levels of star formation activity, including the general field, hitherto unexplored. The results will characterize the properties of dust in different conditions, at the LMC metallicity, which is useful to intepret integrated properties of distant galaxies, as well as GALEX upcoming UV surveys. A complementary study is under way with FUSE in the far-UV range. The combined results will provide insight on the properties of small grains.
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Proposal Category: GO
Scientific Category: STELLAR POPULATIONS
ID: 9828
Title: Young Massive Clusters in M33
PI: Luciana Bianchi
PI Institution: The Johns Hopkins University

Young Massive Clusters (YMC) appear to be abundantly forming in merging galaxies, but are not found in the Milky Way. They provide the opportunity to study the conditions necessary for the formation of massive, compact stellar systems, giving insight into conditions of the earliest epochs of galaxy formation, when ancient Globular Clusters (GC) formed, thus helping to constrain scenarios of galaxy formation and evolution. We propose STIS UV spectroscopy of three extremely young, UV-luminous clusters in the Local Group spiral galaxy M33, selected from our extensive survey with WFPC2 imaging. From multi-band integrated photometry we inferred age upper limits of 10 Myrs: UV spectra will provide precise ages, thus masses, for these objects from the earliest spectral types present, revealed by the strong spectral signatures, and from synthetic spectral modeling. We will be able to assess whether their mass overlap with GC masses, and whether such systems can survive internal dynamical evolution. These young, massive and compact objects provide a key link to the young cluster systems in mergers, and may be the only such counterparts accessible to detailed studies.
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Proposal Category: GO
Scientific Category: AGN/QUASARS
ID: 9829

Title: HST / Chandra Monitoring of a Dramatic Flare in the M87 Jet
PI: John Biretta
PI Institution: Space Telescope Science Institute

As the nearest galaxy with an optical jet, M87 affords an unparalleled opportunity to study extragalactic jet phenomena at the highest resolution. During 2002, HST and Chandra monitoring of the M87 jet have detected a dramatic flare in knot HST-1 located ~1" from the nucleus. Its brightness has increased ten-fold in the optical band, and continues to increase, and the X-rays show a similarly dramatic outburst. In both bands this HST-1 now rivals the nucleus in brightness. To our knowledge this is the first incidence of an optical or X-ray outburst from a jet region which is spatially distinct from the core source; this presents an unprecedented opportunity to study the processes responsible for non-thermal variability and the X-ray emission. We propose four epochs of HST/ACS monitoring during Cycle 12, as well as seven epochs of Chandra/ACIS observation (5ksec each). We also include a brief STIS observation that will be used with prior STIS data to measure proper motions, and ACS polarimetry to map the magnetic field structure. The results of this investigation are of key importance not only for understanding the nature of the X-ray emission of the M87 jet, but also for understanding flares in blazar jets, which are highly variable, but where we have never before been able to resolve the flaring region in the optical or X-rays. These observations will allow us to test synchrotron emission models for the X-ray outburst, constrain particle acceleration and loss timescales, and study the jet dynamics associated with this flaring component.
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Proposal Category: GO
Scientific Category: GALAXIES
ID: 9830
Title: A New Member of the Local Group?
PI: Gregory Bothun
PI Institution: University of Oregon

An August 2002 detection at 21-cm of a previously undetected low surface brightness galaxy yielded a radial velocity of -360 km/s. As the galaxy is located in the opposite part of the sky as the Virgo cluster, its seems quite likely that this velocity places it squarely in the Local Group (LG). The characteristics of this galaxy, if its at a distance of 1-2 Mpc, are such that it easily could have escaped detection from previous searches. Its optical surface brightness is low and its integrated blue magnitude would lie in the range -6.5 to -8.0. The total H I mass is less than 3 x 10^5 solar masses. The H I profile is relatively low S/N and distorted, with a signal that is spread out over about 80 km/s. much larger than the internal velocity dispersion of the galaxy. This is likely the result of an interaction (most probably with M31). With the efficiency of the ACS, we can easily detect the TRGB population in this object using V and I observations in 2 orbits. The goal here is to provide confirming evidence that this object is indeed a member of the LG by obtaining its distance via the now well calibrtated TRGB method using V-I as the filter system. If indeed in the LG (which seems likely) it would also represent a new kind of dwarf galaxy as its considerably more compact than other LG dwarfs of similar absolute magnitude.
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Proposal Category: SNAP
Scientific Category: COOL STARS

ID: 9831
Title: Multiplicity among brown dwarfs in the Pleiades cluster
PI: Herve Bouy
PI Institution: European Southern Observatory - Germany

We have compiled a sample of 32 confirmed brown dwarfs in the Pleiades cluster. We propose to observe this sample with HST/ACS in SNAPSHOT mode in order to search for very low mass multiple systems. Our goals are: 1) to determine the occurrence and frequency of binary systems among substellar objects, which hold important clues to the formation and evolution mechanism(s) of ultracool and brown dwarfs, 2) to get an estimate of the Initial Mass Function (IMF) at very low masses, which is still unknown and very much needed to be corrected for binarity, 3) to compare the distribution of multiple systems in young open clusters and in the field.

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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9832
Title: A Search for Water Vapor in the Atmosphere of an Extrasolar Planet
PI: Timothy Brown
PI Institution: University Corporation For Atmospheric Research

We propose to search for evidence of water vapor in the transmission spectrum of the transiting planet of HD 209458. A successful detection would not only establish the presence of this important atmospheric constituent, but would also constrain other key properties of this close-in, Jupiter-sized planet. Specifically, relating the absorption caused by water to that already observed from atomic sodium would help establish the height of the atmosphere's uppermost cloud layer (if any). Also, the abundance of water will provide information about that of oxygen, and by extension, that of all heavy elements. To make this measurement, we propose a doubly-differential procedure in which we will use NICMOS in spectroscopic mode to detect the small spectral changes that occur during planetary transits, and that result from absorption of starlight as it passes through the outer parts of the planet's atmosphere. We search for water because it is expected to produce by far the strongest spectrum features within the wavelength range accessible to HST.

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Proposal Category: GO
Scientific Category: COOL STARS
ID: 9833
Title: T Dwarf Companions: Searching for the Coldest Brown Dwarfs
PI: Adam Burgasser
PI Institution: University of California - Los Angeles

Faint companions to known stars have historically led to the discovery of new classes of stellar and substellar objects. Because these discoveries are typically limited by the flux ratio of the components in the system, the intrinsically faintest companions are most effectively identified around the intrinsically faintest primaries. We propose to use NICMOS to image a sample of 22 of the coolest known (T-type) brown dwarfs in the Solar Neighborhood in order to search for fainter and cooler brown dwarf companions. The high spatial resolution of the NIC 1 detector enables us to distinguish binary

systems with apparent separations greater than 0"08, or physical separations greater than 1.2 AU at the nominal distances of the objects in our sample. Furthermore, the substantial sensitivity of NICMOS imaging allows us to probe companion masses of 5-50 Jupiter masses and companion effective temperatures of 250-1300 K in a maximally efficient manner. Based on work to date, we expect that roughly 20% of the objects in our sample will be binary, and that one or two of these will likely harbor a significantly fainter secondary. Hence, we expect to find a companion cooler than any currently known brown dwarf, a potential prototype for the next spectral class. In addition, our investigation will add substantially to the sample of known binary brown dwarfs, allowing improved statistical analyses of the binary fraction, separation distribution, and mass ratio distribution of these systems, key quantities for probing brown dwarf formation. We will also identify optimal substellar systems for astrometric mass measurements, a critical check for theoretical models of brown dwarfs and extrasolar planets.

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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9834
Title: Finding Planets in the Stellar Graveyard: A Faint Companion Search of White Dwarfs with NICMOS
PI: John Debes
PI Institution: Pennsylvania State University

We propose to do a deep search for substellar objects in orbit around white dwarfs with the newly refurbished NICMOS camera as part of the PI's doctoral thesis work. Direct imaging of planets around main sequence stars is difficult due to the large contrast ratio, a problem which is much less severe for companions to white dwarfs. White dwarfs are not usually considered in planet searches but recent theoretical work and observations are motivating new searches for planetary systems and dust disks around DAZ white dwarfs. We propose to conduct the search with the NIC2 coronagraph to find resolved companions and do photometry to search for unresolved companions through Near-IR excesses. We estimate that the survey will be sensitive to brown dwarfs, high mass jovian planets, and dust disks. By probing a wide range of orbital separations and companion masses, this survey will help to answer questions about the brown dwarf desert, common envelope evolution, and planet formation. HST and NICMOS provide a unique capability to do this search, as no ground based observatory with AO can adequately search for faint companions as close and with such high contrast.

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Proposal Category: GO
Scientific Category: STELLAR POPULATIONS
ID: 9835
Title: Shooting Stars: Looking for Direct Evidence of Massive Central Black Holes in Globular Clusters
PI: Gordon Drukier
PI Institution: Yale University

We propose to make observations that directly test the proposition that globular clusters contain massive black holes. Our targets are the bulge globular clusters NGC 6388 and NGC 6441. These are probably among the most massive in the galaxy, but are understudied compared to more familiar objects such as M15. Our analysis suggests that these two clusters are the most likely to show unambiguous evidence for a central massive black hole if such things

exist in globular clusters. The observations proposed will give us the first thorough kinematic and photometric studies of these two clusters. The combination of the two epochs will give us proper motions good to of order 6 km/s. In addition, they will provide us with the first good, deep, color-magnitude diagrams for these clusters. These diagrams will be used to investigate the make up of the stellar population in the clusters, to more firmly establish their distances, ages, and metallicities, and to search for a binary sequence.
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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9836
Title: The role of dark matter and intracluster gas in galaxy formation and cluster evolution
PI: Richard Ellis
PI Institution: California Institute of Technology

We propose a fully-sampled mosaic of 41 ACS images to survey galaxy morphologies and measure weak lensing signals to the turn-around radius in the X-ray luminous cluster, MS0451-03 (z=0.54). The aim is to isolate the physical processes which affect the evolution of cluster galaxy morphologies in the context of well-defined dynamical system. The study will be used in contrast to a successful campaign undertaken in Cycle 9 on a optically-selected target. By comparing morphologies with spectroscopic and Chandra X-ray data, we will quantify the role of the intracluster medium and associated substructures and establish the timescales and physical regions within which the various environmental processes occur.
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Proposal Category: GO
Scientific Category: STELLAR POPULATIONS
ID: 9837
Title: Stellar Populations in the Outskirts of M33: A Unique Probe of Disk Galaxy Formation
PI: Annette Ferguson
PI Institution: Kapteyn Astronomical Institute

The fossil record of galaxy formation and evolution is imprinted on the structure and composition of galactic stellar populations. We have recently completed an extensive ground-based imaging survey of the low mass Local Group spiral, M33. Our analysis of the global structure of M33 suggests it is a 'pure disk' galaxy, with no discernible stellar halo. Furthermore, the disk surface brightness declines very abruptly beyond ~5 scalelengths. We propose here to obtain deep ACS imagery of two fields in the far outer disk of M33, located at 4.5 and 6 exponential scalelengths. Deep colour-magnitude diagrams reaching main sequence turn-offs of ~8 Gyr (corresponding to star formation episodes since z< 1) will be constructed and used for quantitative modelling of the star formation history. State-of-the-art cosmological simulations of galaxy formation predict stars in the outer regions of galactic disks should be predominantly young-to-intermediate age. The data we propose to obtain will directly test this idea, and provide a much-needed observational constraint on the epoch at which disk galaxies were assembled. The proposed observations will provide an excellent complement to an ongoing Cycle 11 program to study the outer disk of the more massive system, M31.
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Proposal Category: GO
Scientific Category: GALAXIES
ID: 9838
Title: The Upper End of the Supermassive Black Hole Mass Function: Pushing the 10 Billion Solar Mass Limit.
PI: Laura Ferrarese
PI Institution: Rutgers the State University of New Jersey

In 1994, HST provided the first secure detection of a supermassive black hole (SBH) in a galactic nucleus. The galaxy was M87, the black hole almost 4 billion solar masses. Since then, two dozen additional SBH detections have been the outcome of the several hundred orbits of HST time devoted to this cause. Yet, M87's black hole is still the most massive known, and in only two other galaxies have SBHs in excess of a billion solar masses been detected. The aim of this proposal is to characterize the high mass end of the local SBH mass function. Four brightest cluster galaxies have been carefully selected. Their large masses, luminosites and stellar velocity dispersions, as well as their having a merging history which is unmatched by galaxies in less crowded environments, make these galaxies the most promising hosts of the most massive SBHs in the local Universe. It is in the high mass regime that the unavoidable link between the evolution of supermassive black holes and the hierarchical build-up of galaxies leaves its clearest signature. It is these galaxies that are expected to be the relicts of the most luminous high redshift quasars, those so spectacularly targeted by the Sloan Digital Sky Survey. Expanding (and extending) the high mass end of the local SBH mass function is the next obligatory step we need to take to improve our understanding of how SBHs, and their hosts, formed and evolved.
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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9839
Title: Recombination Lines and Temperature Structure in Planetary Nebulae
PI: Donald Garnett
PI Institution: University of Arizona

A high-spatial resolution study of recombination lines (RLs) in bright compact planetary nebulae (PNs) is proposed. Many PNs show a large discrepancy between abundances derived from O II RLs and those derived from [O III]. Others show little or no discrepancy. The PNs with small discrepancies are more compact and high surface brightness. This program seeks to understand why PNs show such differences by studying the RLs at high spatial resolution in the compact PNs NGC 6572 and NGC 6790, which show no discrepancy between O II and [O III], to compare with ground-based studies of the larger PNs NGC 6153 and NGC 6720. The goal is to determine if the distribution of RL emission in NGC 6572 and NGC 6790 is more consistent with radiative recombination than in NGC 6720, where the RL emission is more centrally peaked than [O III]. This will allow us to demonstrate whether or not it is the RLs that are preferentially enhanced in the nebulae with large discrepancies. The Cat's Eye nebula NGC 6543 will also be observed, to determine if the enhanced RL emission is connected to the presence of X-ray emitting gas, as might be expected if the enhanced RLs are a result of high temperature dielectronic recombination.
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Proposal Category: GO

Scientific Category: HOT STARS
ID: 9840
Title: Wind Accretion and State Transitions in the Black Hole Binary Cyg X-1
PI: Douglas Gies
PI Institution: Georgia State University Research Foundation

The black hole binary, Cyg X-1, is generally observed in one of two long duration X-ray states: a low flux, hard spectrum state (most common) and a high flux, soft spectrum state (rare). Models predict that the high/soft state corresponds to a high mass transfer phase in the binary, and since the X-ray source is fueled by accretion from the stellar wind of the supergiant companion, the simple expectation is that the high/soft state results from an increased wind mass loss rate. Alternatively, a decrease in the wind mass loss rate could result in a more ionized and slower wind in the vicinity of the black hole, which would then be more easily accreted by the black hole. The best test of these hypotheses is to observe the UV P Cygni lines of the supergiant that are formed in its wind outflow. We recently used HST/STIS to obtain the first ever high resolution UV spectra of the system while it resided in the unusual high/soft state. Cyg X-1 has now returned to the low/hard state, and here we propose to revisit Cyg X-1 and complete our investigation of the wind - X-ray state connection. The study will determine (1) the mass loss rate and the dynamical (density and velocity) structure of the wind of the supergiant star in both X-ray states, and (2) how the X-ray source ionizes the wind. These spectra will be useful for other investigations and will form an important resource for the entire research community.
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Proposal Category: GO
Scientific Category: COOL STARS
ID: 9841
Title: Ultraviolet Observations of aVery Young Brown Dwarf
PI: John Gizis
PI Institution: University of Delaware

We propose to obtain an ultraviolet spectrum of a 25 jupiter mass, 10 million-year old brown dwarf in the TW Hya association. 2MASSW J1207334-393254 shows extremely strong H alpha emission, making it the brightest and closest member of a rare class of active young brown dwarfs.The UV observations will characterize the hot gas that is deduced to surround this brown dwarf. Very little about brown dwarf activity is understood, but X-ray, optical, and radio studies have shown that brown dwarf activity is quite different from cool star activity. Observations are needed to understand the source of the observed optical emission lines. The proposed observations will supplement existing optical and scheduled Chandra X-ray data.
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Proposal Category: SNAP
Scientific Category: COOL STARS
ID: 9842
Title: A Snapshot Search for Halo Very-Low-Mass Binaries
PI: John Gizis
PI Institution: University of Delaware

We propose a snapshot search for binary M subdwarf stars. These nearby stars have high velocities and low metallicies that identify them as members of the

old Galactic halo (Population II). ACS imaging is requested to search for secondary companions. This supplements a previous snapshot program that only obtained 10 observations. The observed binary fraction will be compared to the disk M dwarf fraction to look for differences in star formation. It is likely that a system suitable for orbital mass determinations will be found. In this case, future HST observations could determine the first masses for very-low-mass, low-metallicity stars.
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Proposal Category: GO
Scientific Category: COOL STARS
ID: 9843
Title: NICMOS Observations of Cool Brown Dwarf Doubles
PI: John Gizis
PI Institution: University of Delaware

We propose to use NICMOS to observe two brown dwarf systems discovered using HST/WFPC2 imaging. Each of the two late-L dwarf primaries has a secondary that is much fainter. Based on the limited optical photometry available, the secondaries lie at the L/T Dwarf transition, and may lie anywhere in the range from L9 (cooler than any known L dwarf) or early-T. NICMOS photometry will be used to characterize the spectral energy distribution and search for methane absorption.
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Proposal Category: GO
Scientific Category: COOL STARS
ID: 9844
Title: Brown dwarf atmospheric variability observations
PI: Bertrand Goldman
PI Institution: New Mexico State University

We propose to use NIC1 and NIC2 to study brown dwarfs for atmospheric variability. We will observe a sequence of early Ts, a detected variable T2, a T3 and a T4.5. Atmospheric variability, that is expected by some models for these objects, would constrain the physical parameters of cloud vertical distribution, horizontal homogeneity and the dynamics of the very cool atmospheres. The existence and amplitude of the variations would reveal the size and distribution of the cloud cover over the surface of the brown dwarf and test a model explaining the rapidity of the L to T type transition. The relative color changes would constrain the vertical extent of dynamical process and the depth in the atmosphere at which they take place. If a periodicity is measured, the rotational period of the dwarf could be estimated. HST provides the unique and crucial opportunity to observe beyond Earth atmospheric variable absorption, particularly in the important water bands.
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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9845
Title: NICMOS Confirmation of a Young Planetary-Mass Companion
PI: Michael Liu
PI Institution: University of Hawaii

We have recently discovered a strong candidate for a planetary-mass (~10 Mjup) companion to a young Sun-like star, based on near-IR imaging and spectroscopy

with the Keck and Subaru adaptive optics (AO) systems. While the ground-based data strongly suggest that the candidate has a very low effective temperature, and hence a very low mass, they are not definitive. We propose to obtain NICMOS coronagraphy to measure the companion's 1.9um water-band absorption. This feature is a distinct signature of very cool objects and is unobservable from the ground. The combined ground-based and space-based data set will dermine whether the companion has a very low temperature, and hence if it is the lowest mass companion found to date by direct imaging.

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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9846
Title: The Origins of Sub-stellar Masses: Searching for the 'End" of the IMF
PI: Michael Meyer
PI Institution: University of Arizona

Is there a preferred scale that defines the end of the IMF? We propose to test this hypothesis by conducting a deep spectroscopic survey of extremely low mass objects in the embedded young cluster associated with NGC1333. At a distance of only 300pc, this cluster is one of the nearest examples of a dense young cluster. We will be able to obtain R=200 spectra and photometry for 40-60 cluster members with masses between 5-40 Jupiter masses at an age of 1 Myr observed through A(v)<10 mag. This will enable us to estimate temperatures and luminosities for all sources detected in the survey. We will compare their positions in an H-R diagram to PMS evolutionary tracks in order to estimate their ages and masses. For a solar metallicity cloud at a temperature of 10 K, the minimum mass for fragmentation is thought to be 10 Jupiter masses. A statistically significant sample of objects detected below this limit would challenge the role of hierarchical fragmentation in limiting substellar masses. The proximity of this cluster combined with the unique sensitivity, wavelength coverage, and multi-object spectroscopic capability of NICMOS on HST make this experiment possible.

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Proposal Category: GO
Scientific Category: AGN/QUASARS
ID: 9847
Title: The Structure and Physics of Extragalactic Jets
PI: Eric Perlman
PI Institution: University of Maryland Baltimore County

As part of an ongoing investigation into the physics of jets, we propose to obtain ACS polarimetry of the jets of 3C 15, 3C 66B, 3C 346, 3C 371 and PKS 0521-36. This builds on our earlier HST work and completes a sample of 9 jets that spans the range of jet luminosities and morphological types. All of these jets have deep, multi-band HST imaging, and radio polarimetry at matching resolution, and all but one has Chandra data. Our goal is to investigate three fundamental issues, brought to light by recent HST and Chandra observations. These are: (1) What is the energetic and magnetic field structure of jets? (2) What is the nature of particle acceleration in jets? (3) What is the nature of the X-ray emission from jets, and what is its relationship to lower energy emissions? Optical polarimetry provides unique information about all of these issues. Because of their vastly different radiative lifetimes (hundreds of years compared to millions), optical and radio polarimetry probe different electron populations and emission regions.

Comparison of radio and optical polarimetry can therefore yield direct information about the three-dimensional energetic and magnetic field structure of jets. Optical polarimetry traces the magnetic field configuration in and near electron acceleration regions, and when combined with optical and X-ray spectral index maps, polarimetry can yield key constraints about particle acceleration and the nature of the X-ray emission of jets.
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Proposal Category: SNAP
Scientific Category: HOT STARS
ID: 9848
Title: A SNAPSHOT Survey of Sharp-Lined Early B-Type Stars
PI: Geraldine Peters
PI Institution: University of Southern California

Although spectrum synthesis studies of the UV spectra of sharp-lined main sequence B stars provide us with some our best determinations of the abundances of the Fe group and neutron capture elements and the chemical evolution in our galaxy and the Magellanic Clouds, the HST archive is virtually devoid of high resolution spectra of the bright nearby B stars that have become to be regarded as abundance standards. For example, there are NO observations of HR 1886, iota Her, and tau Her, the sharpest-lined representatives (V sin i < 5 km/s) of spectral classes B1 V, B3 IV-V and B5 IV, and only a few tiny spectral intervals of gamma Peg (B2 IV). Information on the abundances of the Fe group is important for computing opacities for stellar evolution calculations and for determining astrophysical f-values. There are no suitable galactic standards in the HST database to compare with recent HST/STIS observations of B stars in the Magellanic Clouds and the likely future observations of similar objects in M31 and other nearby galaxies. To correct this deficiency, we propose SNAPSHOT observations with the STIS E140M and E230M gratings of 33 of the best bright abundance standards in nearby clusters and the galactic field. Using this data we will determine the abundances of the Fe group and heavy elements using the technique of spectrum synthesis with LTE and NLTE treatments. We waive the proprietary period.
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Proposal Category: GO
Scientific Category: AGN/QUASARS
ID: 9849
Title: AGN Black Hole Masses from Stellar Dynamics
PI: Bradley Peterson
PI Institution: Ohio State University

We propose to measure the black-hole masses in two reverberation-mapped Seyfert 1 galaxies, NGC 3227 and NGC 4151, by using STIS spectroscopic observations of the Ca II triplet absorption features in the nuclear stellar spectra of these sources. The observations will be carried out on a TOO basis when the active nuclei are faint, thus mitigating the problem of contamination of the starlight component by the scattered light from the active nucleus. These observations will enable the first direct comparison of black-hole masses determined from stellar dynamics (the most frequently used method for quiescent galaxies) with those determined by reverberation mapping (the most frequently used method for active galaxies).
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Proposal Category: GO

Scientific Category: AGN/QUASARS
ID: 9850
Title: Structure of the Accretion Disk in the NLS1 NGC 4051
PI: Bradley Peterson
PI Institution: Ohio State University

We propose to obtain a UV spectrum of the narrow-line Seyfert 1 (NLS1) galaxy on a target-of-opportunity basis when it goes into a faint state for the purpose of exploring the variable nature of the shape of the ionizing continuum in this source. Previous simultaneous X-ray and optical monitoring of this source reveals that at some times the X-rays and the He II 4686 emission line nearly disappear, while the UV/optical continuum and Balmer lines are weaker, but present and continue to vary. This suggests that there is a variable cutoff in the shape of the ionizing continuum, and in the faint state this occurs at low enough energies to affect all the strong UV lines. By comparing emission-line flux ratios in the low state to those in high states and with photoionization equibrium calculations, we can identify the cutoff energy. The cutoff energy may correspond to a transition radius in the accretion disk, inside of which the source has entered into a low-radiative efficiency mode.
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Proposal Category: SNAP
Scientific Category: AGN/QUASARS
ID: 9851
Title: Host Galaxies of Reverberation-Mapped AGNs
PI: Bradley Peterson
PI Institution: Ohio State University

We propose to obtain unsaturated ACS high-resolution images of all reverberation-mapped active galactic nuclei in order to remove the point-like nuclear light from each image, thus yielding a "nucleus-free" image of the host galaxy. This will allow investigation of host-galaxy properties: our particular interest is determination of the host-galaxy starlight contribution to the reverberation mapping observations, which is necessary for accurate determination of the relationship between the AGN continuum flux and the size of the broad Balmer-line emitting region of AGNs. Because this relationship is used to estimate black-hole masses of large samples of distant AGNs, correct determination of the slope of this relationship is critically important.
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Proposal Category: GO
Scientific Category: COOL STARS
ID: 9852
Title: Whirling Dervish Dynamos: Magnetic Activity in CV Secondaries
PI: Steven Saar
PI Institution: Smithsonian Institution Astrophysical Observatory

The mass-losing secondary stars of cataclysmic variables (CVs) are the most rapidly rotating cool dwarfs observable. Other rapid rotators show a maximal, ``saturated" level of magnetic activity (e.g., X-ray emission), but there are hints from contact binaries and young clusters that activity may be suppressed at the highest rotation rates. CV secondaries are thus important probes of magnetic dynamos at rotational extremes. Implications for CV evolution (e.g., the ``period gap", accretion variability) may also be profound. Unfortunately, study of CV secondaries is hampered by pesky accretion-related

phenomena and reflection effects. As a result, little systematic work has been done. To explore activity in these stars, we therefore propose to study far-UV spectra of AM Her-type systems (which have no accretion disks) in deep photometric minima in which accretion is shut off. Magnetic-related emission from the secondary will be separated (in velocity) from residual accretion emission by observations near quadratures. Lower chromospheric irradiation due to the white dwarf primary will be removed by modeling, yielding the true level of magnetic activity on the secondary. We will compare the results to other dMe stars and draw implications for magnetic dynamos and activity at rotational extremes, and for CV evolution and behavior.
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Proposal Category: GO
Scientific Category: STAR FORMATION
ID: 9853
Title: A Search for Young Binary Brown Dwarfs: Constraining Formation Scenarios and Masses Through Multiplicity
PI: Russel White
PI Institution: California Institute of Technology

We propose to use the Advanced Camera for Surveys / High Resolution Camera to conduct a direct imaging multiplicity survey of 34 young brown dwarfs in the nearest regions of recent star formation, the T association Taurus-Auriga and the OB association Upper Scorpius. The determined multiplicity fraction, the separation distribution, and the mass ratio distribution will offer stringent observational contraints on proposed brown dwarf formation scenarios. Moreover, the small semi-major axes of known field and open cluster brown dwarf binaries suggest the exciting possibility of our identifying several very close binaries (< 15 AU). Continued monitoring of these systems would yield, on a decade timescale, the first dynamical mass estimates of T Tauri brown dwarfs. With masses intermediate between those of stars and planets, brown dwarfs offer our best hope of relating the reasonably well understood processes of star formation to the less well understood processes of planet formation.
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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9854
Title: Anomalous Flux Ratios in Quadruple Gravitationally Lensed QSOs
PI: Scott Burles
PI Institution: Massachusetts Institute of Technology

We propose to observe eight (8) gravitationally lensed systems which exhibit quadruple images of the backgrouund high redshift quasars. Models invoking a smooth potential fit the observed image positions accurately, in most cases better than 5 milliarcseconds. But the same models dramatically fail to predict the observed flux ratios. These anomalous flux ratios can be attributed to micro- or milli-lensing in the massive lensing halo. In this proposal, we will isolate the source of the anomalous flux ratios by using the superior resolution of HST/STIS to obtain spectrophotometric data and compare the emission line flux ratio of the QSOs to the continuum flux ratios. Due to the much larger size of the broad emission line regions, the flux ratios in the emission lines should only be affected by milli-lensing if the sub-halos are comparable or larger in projected size than the source region. That is, flux ratios observed in the QSO continuum are senstive to substructure on all

scales (both micro- and milli-lensing), while the broad emission lines are insensitive to micro-lensing due to the larger physical size of the source emission region. This sample of eight quasars will provide the definitive evidence to distinguish between possible sources causing the observed anomalous flux ratios.
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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9855
Title: Exploring Interstellar Krypton Abundance Variations at Kiloparsec Scales
PI: Stefan Cartledge
PI Institution: Louisiana State University & Agricultural & Medical College

We propose to obtain high-resolution STIS echelle observations of the interstellar Kr I 1236 absorption toward eight stars situated in the Galactic disk beyond the Carina/Sagittarius or Perseus Arms. The measurement of interstellar krypton abundances is a relatively simple way to investigate elemental abundance variations in the Galaxy, since its dominant form is neutral and it is undepleted in the ISM. Furthermore, the intrinsic strengths of krypton's UV resonance lines combined with its low relative abundance to hydrogen produce weak, unsaturated features in typical Galactic sight lines. Previous GHRS and STIS measurements have demonstrated that Kr/H abundance ratios within the local spiral arm, the Orion Spur, are remarkably uniform; however, anomalously high krypton abundances have been measured for the only two sight lines extending also through gas outside the Orion Spur. This program is designed to determine whether these sight lines are isolated cases of enrichment, or if they are representative of large scale krypton abundance variations outside the local arm. Since krypton is undepleted in the ISM, these observations will also be relevant to the study of total elemental abundance and depletion variations for a variety of elements with resonance lines between 1170 and 1372 Angstroms.
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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9856
Title: A near-IR imaging survey of submm galaxies with spectroscopic redshifts
PI: Scott Chapman
PI Institution: California Institute of Technology

Submillimeter (submm) surveys with SCUBA have identified a population of obscured star-forming and active galaxies at high redshift. Our recent spectroscopic campaigns with the Keck-10m telescope have uncovered redshifts for 37 SCUBA galaxies. The wide redshift range of the radio identified submm population (z=1-4) implies that many varieties of sources driven by different physical processes may be selected in a submm survey. Only HST observervations have the resolution to detect any changes in the morphologies of SCUBA galaxies with increasing cosmic time. We propose to use HST-NICMOS,ACS to obtain 2-filter images of a sample of 15 SCUBA galaxies with redshifts spanning z=0.8-3.5. Our goal is to understand what physical process (major mergers?) drive their strong evolution and great luminosities, and what the implications are for galaxy evolution models.
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Proposal Category: GO
Scientific Category: ISM AND CIRCUMSTELLAR MATTER
ID: 9857
Title: A tailored survey of proplyds with the ACS
PI: Orsola De Marco
PI Institution: American Museum of Natural History

While our specific understanding of the proto-planetary disks in Orion is increasing, our general knowledge of what promotes and hinders their birth and longevity is hampered by having good observations in only this one region. Observations of proplyds in other regions with different conditions of ultraviolet irradiation and age can provide more stringent tests of our present models. We have therefore designed an ACS/WFC and parallel WFC2 survey of open clusters embedded in H II regions that, with a small number of orbits, maximizes the probability of succesfully finding proplyds there. Our observing strategy will additionally afford a quantitative study of the detected proplyds, as well as the derivation of a correlation between those characteristics and the clusters' stellar population. ACS gives us an unprecedented opportunity to kick start the mass discovery of proplyds in many environments, an obvious way in which progress can be made in this field. This small tailored survey, gives us an excellent chance to obtain a huge return at low cost.
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Proposal Category: GO
Scientific Category: QUASAR ABSORPTION LINES AND IGM
ID: 9858
Title: A Search for the Missing Baryons in Nearby Cosmic Filaments
PI: Renato Dupke
PI Institution: University of Michigan

Most of the baryons in the local universe are "missing" in that they are not in galaxies or in the previously detected gaseous phases. These missing baryons are predicted to be in a warm-hot low density phase, largely in the giant cosmic filaments that connect the denser virialized clusters and groups of galaxies. Models show that the highest covering fraction of such filaments occurs in superclusters and observations of two AGNs behind known superclusters showed multiple LyAlpha absorption systems at the supercluster redshift. These results are impressive considering that these AGNs were not even optimally located. Here we selected a several AGNs that lie close to the expected central axis of supercluster filaments. These HST observations will identify LyAlpha absorbing gas while a complementary FUSE program will search for OVI gas in the same systems.
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Proposal Category: GO
Scientific Category: GALAXIES
ID: 9859
Title: Nailing Down M31's Central Black Hole
PI: Eric Emsellem
PI Institution: Centre de Recherche Astronomique de Lyon

The mass of the supermassive black hole (BH) in the double nucleus of the nearby galaxy M31 will be determined to 30% accuracy. This will be accomplished using the spectrum of the UV peak, a 0.4 pc stellar cluster of

stars associated with the BH, and the line of sight velocity distributions (LOSVDs) of the underlying nucleus. HST/STIS, in its G430L configuration, is the only instrument that can obtain a high spatial resolution spectrum in the blue spectral domain where this UV cluster significantly contributes. The expected velocity dispersion of this cluster is greater than 550 km/s and will be measured with an accuracy of 10% with the previously detected Balmer lines. The high signal-to-noise attained simultaneously in the 4500-5500 Angstrom region will be exploited to retrieve the full LOSVDs of the nuclear disk in the region where the dispersion is high. The LOSVDs will be used in turn to constrain dynamical models of eccentric (m=1) Keplerian modes, developed to account for the asymmetries seen in M31's nucleus. This proposal combines the efforts of four groups that are leading the effort to understand the role of such m=1 modes in galactic nuclei, especially via its most nearby example in the nucleus of M31.

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Proposal Category: GO
Scientific Category: COSMOLOGY
ID: 9860
Title: ESSENCE: Measuring the Dark Energy Equation of State
PI: Peter Garnavich
PI Institution: University of Notre Dame

The accelerating universe appears to be dominated by a dark energy with a significant negative pressure. The ratio of the pressure to density of this mysterious energy (its equation of state) is an observable which can differentiate between the proliferating candidate theories. We propose to estimate the dark energy equation of state by observing Type Ia supernovae at redshifts near z=0.7 with HST in concert with the on-going ESSENCE NOAO Survey program that is discovering and studying supernovae between 0.3<z