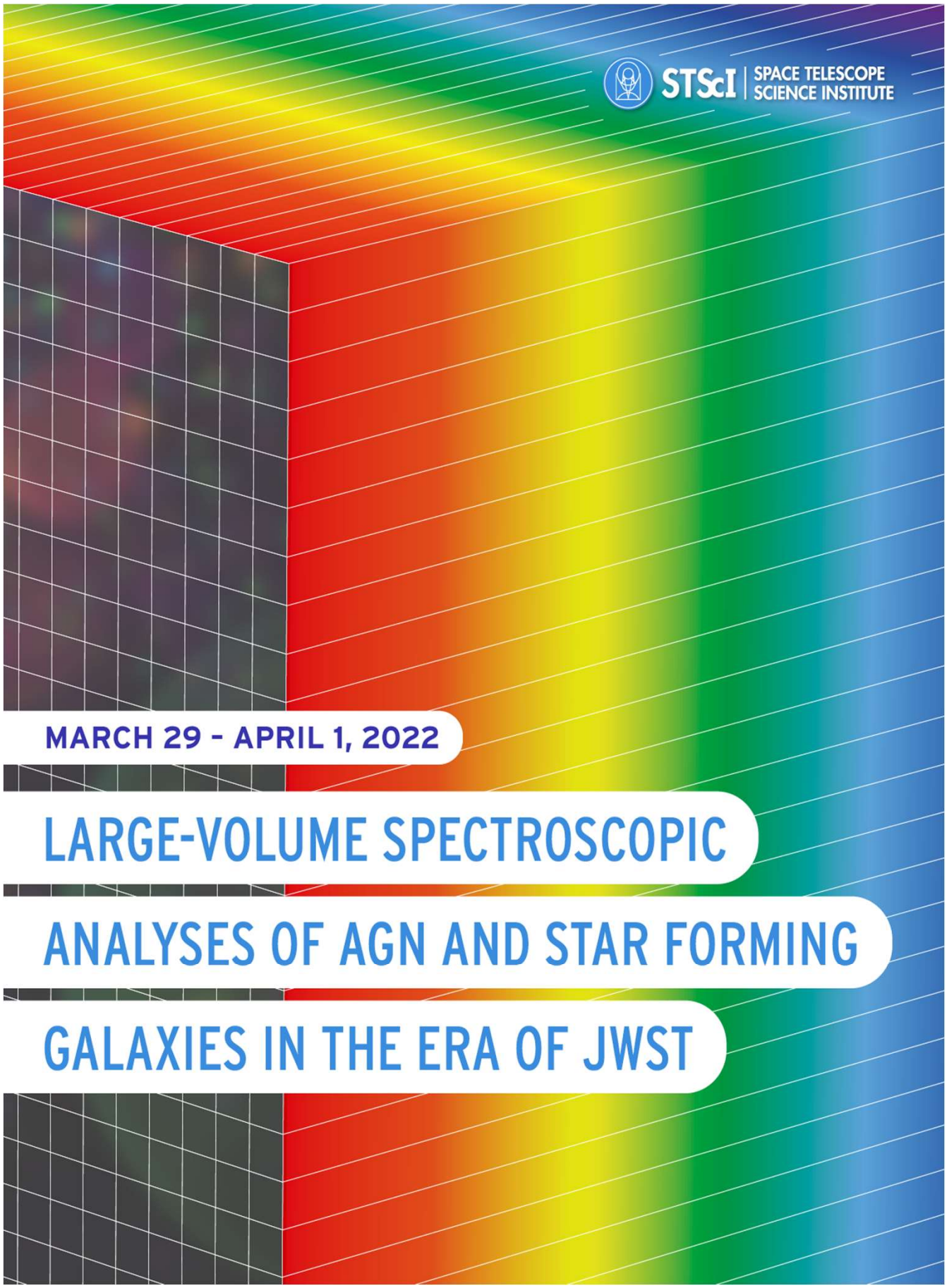
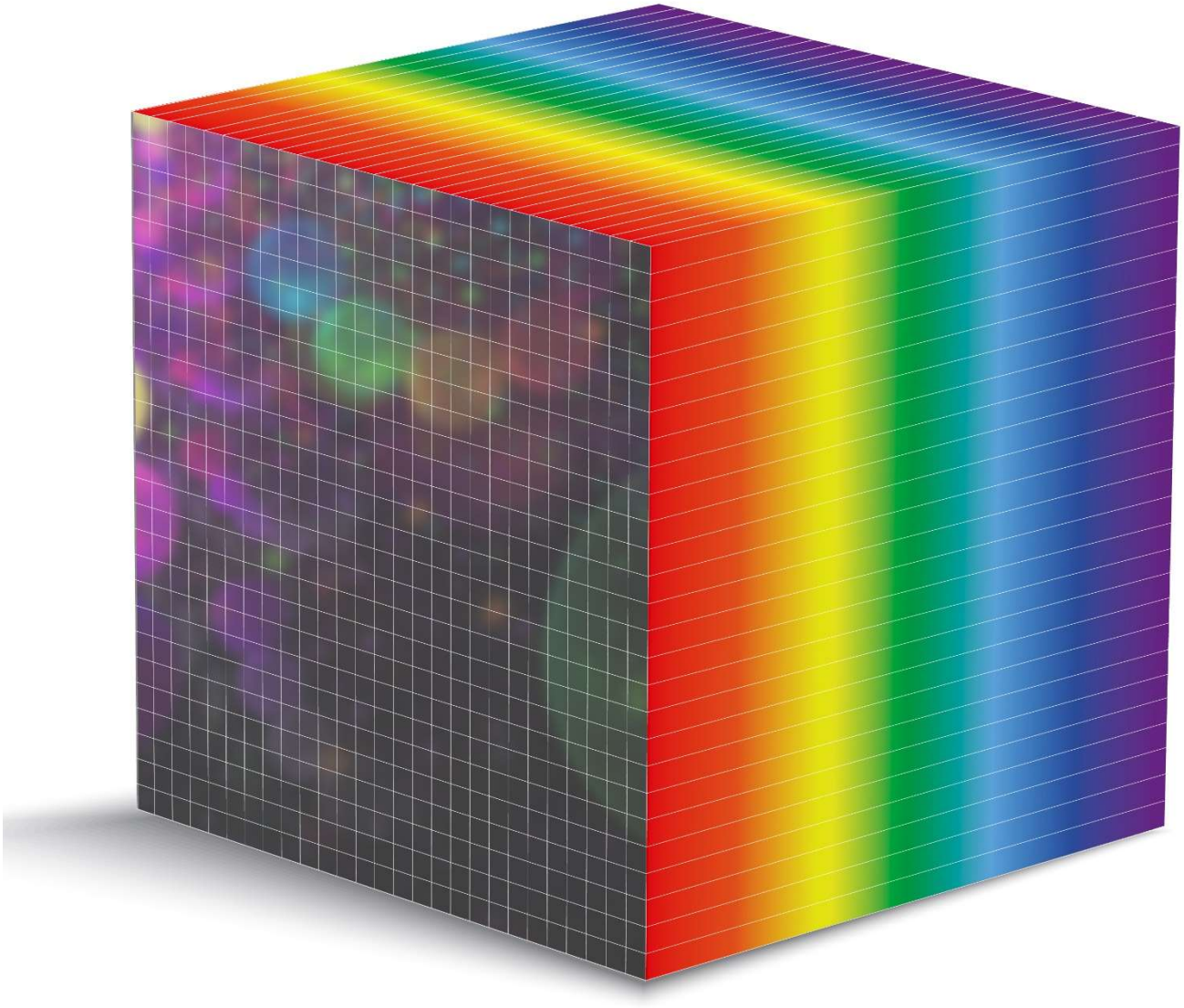

STScI | SPACE TELESCOPE SCIENCE INSTITUTE
MARCH 29 - APRIL 1, 2022
LARGE-VOLUME SPECTROSCOPIC ANALYSES OF AGN AND STAR FORMING GALAXIES IN THE ERA OF JWST

Massive spectroscopic datasets, in the form of IFU datacubes and large surveys consisting of thousands of spectra, have begun to stream into archives on a daily basis, and will soon include observations from NIRSpec and MIRI aboard JWST. Creating and testing spectroscopic analysis tools can be expensive to astronomers, requiring large amounts of development time for a task that may have already been developed elsewhere in the scientific community. We present the Space Telescope Science Institute's Spring 2022 Science Workshop, dedicated to discussing what tools astronomers currently use to analyze large numbers of complex spectroscopic data in AGN and star-forming galaxies and how users can apply these tools for analysis to their own (potentially non-AGN/galaxy related) data. The workshop will also help users scale the sometimes daunting initial learning curve by connecting them with the tool's designers or expert users.

This workshop will include mornings of invited talks on several fitting tools as well as contributed talks and e-posters selected from abstract submissions. Afternoons will have hands-on working sessions, with speakers from that day walking through spectral analyses using their tool from initial dataset to measurement output. The workshop will conclude by summarizing the presented tools and hosting a 'rodeo' in which each submitted tool will provide an analysis of the same IFU datacube, with individual results from each routine being discussed and compared in a scientific and technical context. This workshop welcomes users at all levels of experience in spectroscopic analysis.

Agenda



Tuesday, March 29, 2022

9:00-9:20	POSTER VIEWING	GatherTown.com
9:20-9:30	WELCOME	**Welcome from Ken Sembach, STScI Director**
		Welcome and Introduction from Organizers
9:30-9:50	Invited Speaker Michele Cappellari	Overview of the pPXF method and science
9:50-10:05	Tanio Diaz-Santos	CAFE-NG: The Next Generation of the Continuum And Feature Extraction tool
10:05-10:20	Eric Martínez-García	Significant issues when fitting spatially resolved star-forming galaxies.
10:20-10:35	Wilfried Mercier	MocKinG: a new tool to model galaxy dynamics and mass distribution from integral field spectroscopy data
10:35-11:00	BREAK	
11:00-11:20	Invited Speaker Dzhuliya Dashtamirova	Bayesian Evidence Analysis Tool
11:20-11:35	Igor Zinchenko	ELF3D: a parallel code for emission line fitting
11:35-11:50	Giacomo Venturi	The properties of ionized outflows and the role of low-power, compact jets in local AGN under the integral field eye of VLT/MUSE
11:50-12:05	Matilde Mingozzi	AGN outflows in ram-pressure stripped galaxies
12:05-1:00	Lunch Break	
1:00-1:30	LIGHTNING POSTER TALKS	
1:30-2:20	WORKSHOP	pPXF – Michele Cappellari
2:20-2:40	BREAK	
2:40-3:30	WORKSHOP	BEAT – Dzhuliya Dashtamirova
3:30-4:00	POSTER VIEWING	GatherTown.com

Wednesday, March 30, 2022

9:00-9:30	POSTER VIEWING	GatherTown.com
9:30-9:50	Invited Speaker Anne Medling	LZIFU: the spectral analysis tool for lazy astronomers
9:50-10:05	Adrian Bittner	The GIST Framework: A Multi-Purpose Tool for the Analysis and Visualisation of (Integral-field) Spectroscopic Data
10:05-10:20	Matthew Selwood	Automatic Spectral Analysis of Type 2 AGN with QSFit
10:20-10:35	Alice Concas	Ionised gas outflows at Cosmic Noon: a new physically-motivated method
10:35-11:00	BREAK	
11:00-11:20	Invited Speakers Patrick Ogle/ Camilla Pacifici	Jdaviz: An interactive visual data analysis tool in the Jupyter platform
11:20-11:35	Vital Fernández	LiMe: A Line Measuring library for the chemodynamic treatment of ionized gas.
11:35-11:50	ChangHoon Hahn	Accelerated Bayesian Galaxy SED Modeling using Machine Learning
11:50-12:05	Kyle Westfall	The SDSS-IV/MaNGA Data Analysis Pipeline
12:05-1:00	Lunch Break	
1:00-1:30	LIGHTNING POSTER TALKS	
1:30-2:20	WORKSHOP	LZIFU – Anne Medling
2:20-2:40	BREAK	
2:40-3:30	WORKSHOP	specutils/Jdaviz – Patrick Ogle & Camilla Pacifici
3:30-4:00	POSTER VIEWING	GatherTown.com

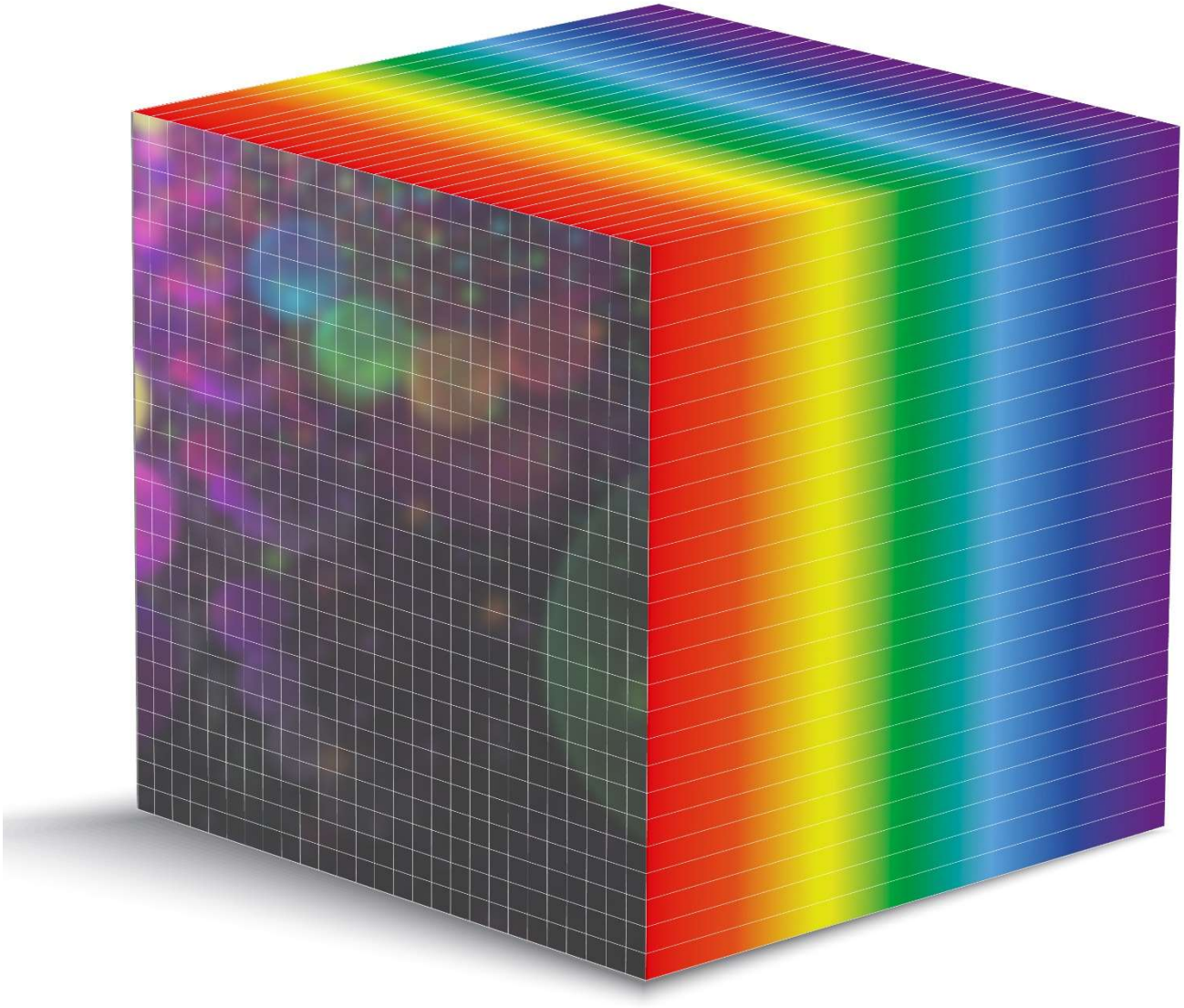
Thursday, March 31, 2022

9:00-9:30	POSTER VIEWING	GatherTown.com
9:30-9:50	Invited Speaker Sebastian Sanchez	Pipe3D, a pipeline for IFS galaxy surveys
9:50-10:05	Roger Wesson	ALFA: automated line fitting algorithm
10:05-10:20	Rubén García-Benito	PyJIN: direct method abundances for large surveys
10:20-10:35	Yasha Kaushal	Stellar velocity dispersions determine the path: A census of star formation histories of star-forming and quiescent galaxies at 0.6 < z <1 with LEGA-C and Bagpipes
10:35-11:00	BREAK	
11:00-11:20	Invited Speaker Remington Sexton	BADASS - An automated spectral fitting pipeline in Python for Galaxies and Quasars.
11:20-11:35	Caroline Bertemes	The MIR fitting capabilities of q3dfit, a PSF deconvolution and spectral analysis tool in the wake of JWST
11:35-11:50	Andrey Vayner	Fitting rest-frame UV and optical IFS data with Q3Dfit for JWST
11:50-12:05	Rebecca Davies	Spatial and Spectral Decomposition of Star Formation, AGN Activity, and Shocks in IFU Data
12:05-1:00	Lunch Break	
1:00-1:30	LIGHTNING POSTER TALKS	
1:30 2:20	WORKSHOP	Pipe3D Sebastian Sanchez
2:20-2:40	BREAK	
2:40-3:30	WORKSHOP	BADASS – Remington Sexton
3:30-4:00	POSTER VIEWING	GatherTown.com

Friday, April 1, 2022

9:00-9:30	POSTER VIEWING	GatherTown.com
9:30-9:50	Invited Speaker J.D. Smith	PAHFIT at 15 years: The Past, Present, and Future of Mid-Infared Spectral Modeling of Galaxies
9:50-10:05	Christiaan Boersma	The NASA Ames PAH IR Spectroscopic Database
10:05-10:20	Alexandros Maragkoudakis	Linking Characteristics of the Polycyclic Aromatic Hydrocarbon Population with Galaxy Properties: A Quantitative Approach Using the NASA Ames PAH IR Spectroscopic Database
10:20-10:35	Stephanie Juneau	Elucidating the impact of galaxy substructure on AGN feedback with IFU observations
10:35-11:00	BREAK	
11:00-11:20	Ciro Pappalardo	Stellar age and metallicity of galaxies in spectral synthesis methods
11:20-11:35	Adam Carnall	Bayesian Analysis of Galaxies for Physical Inference and Parameter EStimation
11:35-11:50	Christophe Morisset	How Neural Networks can boost nebular analysis
11:50-12:05	Elizabeth Tarantino	Modeling Ionized Gas at Low Metallicities: The Wolf-Rayet Emission Nebula N76
12:05-1:00	Lunch Break	
1:00-1:30	POSTER VIEWING	GatherTown.com
1:30 2:20	WORKSHOP	PAHFIT J.D. Smith
2:20-2:40	BREAK	
2:40-4:00	RODEO	

Abstracts



Caroline Bertemes (Heidelberg University)

The MIR fitting capabilities of q3dfit, a PSF deconvolution and spectral analysis tool in the wake of JWST

In recent years, the emerging myriad of IFU surveys has revolutionised our understanding of galaxies as extended dynamical systems and continues to do so. In particular, the recently-launched JWST will offer an unprecedented combination of sensitivity, spatial resolution and wavelength coverage in its IFU instruments. In this era, numerous scientific studies focusing on quasars and other objects with a luminous point source will depend upon an accurate PSF deconvolution, which can be aided by leveraging the 3D nature of the data. In the context of the JWST Early Release Science program Q3D targeting 3 luminous quasars, our team is providing the community with our custom developed python package q3dfit, a data analysis tool performing PSF deconvolution and spectral analysis optimised for NIRSpec and MIRI IFS mode data. In this talk I will present specifically the MIR fitting pipeline of our software, based on the IDL package questfit (Schweitzer et al. 2008) which was originally designed for Spitzer IRS spectra of nearby quasars and luminous galaxies. I will provide a detailed overview over the PSF deconvolution, MIR continuum fitting philosophy introducing different spectral components such as blackbodies, PAHs, absorption, extinction and silicates (plus any user-defined components), as well as line fitting capabilities through pPXF.

Adrian Bittner (Southern Observatory)

The GIST Framework: A Multi-Purpose Tool for the Analysis and Visualisation of (Integral-field) Spectroscopic Data

We introduce a convenient, all-in-one framework for the scientific analysis of fully reduced, (integral-field) spectroscopic data. The GIST framework conducts all steps from the preparation of input data, over the scientific analysis to the production of publication-quality plots. In its default implementation, it extracts stellar kinematics, performs an emission-line analysis, derives star formation histories as well as stellar population properties. To this end, the GIST exploits the well-known pPXF and GandALF routines. In addition, the framework is not specific to any instrument or analysis technique and provides easy means of modification and further development, as of its modular code architecture. In fact, it is not only a neat combination of already existing fitting routines, but a fully modular framework for the analysis of spectroscopic data in the context of a variety of scientific objectives. The software further features the dedicated visualisation routine Mapviewer which has a sophisticated graphical user interface. This allows the easy, fully-interactive plotting of all measurements, in particular maps, observed spectra, fits, residuals, as well as star formation histories and the weight distribution of the models. An elaborate, Python-native parallelisation is implemented and tested on various machines from laptop to cluster scales. To date, the GIST framework has successfully been applied to both low and high-redshift data from MUSE, PPAK (CALIFA), SINFONI, KCWI, and MaNGA, as well as to simulated data for HARMONI and WEAVE and the data analysis of several independent collaborations (e.g. TIMER, Fornax3D, MAGPI, WEAVE) is based on GIST.

Christiaan Boersma (NASA/SJSURF)

The NASA Ames PAH IR Spectroscopic Database

Emission from polycyclic aromatic hydrocarbons (PAHs) permeates the Cosmos and can represent up to ~40% of a galaxy's infrared (IR) energy budget. PAHs are chicken wire-shaped molecules made up of carbon and hydrogen decorating their periphery. The astronomical PAH signature is distinct with strong bands and weaker features on top broad plateaus, which hold information on the underlying PAH population. In turn, since PAHs don't only witness their environment but also actively participate in controlling it, they are excellent probes for astrophysical and astrochemical conditions.
The NASA Ames PAH IR Spectroscopic Database (PAHdb; www.astrochemistry.org/pahdb/) is a database with associated models and tools to readily analyze and interpret astronomical PAH emission spectra. PAHdb contains the spectra from over 4,000 PAHs that can be used to extend the traditional band strength analysis to readily quantify the PAH charge state, size distribution, etc. through a database-fitting approach. PAHdb models and tools are implemented using both IDL (github.com/pahdb/AmesPAHdbIDLSuite) and Python (github.com/pahdb/AmesPAHdbPythonSuite).
The PAHdb-fitting approach has proven highly successful for interstellar medium sources and is being expanded to galaxies. High-fidelity spectral data to be offered by the James Webb Space Telescope (JWST) is set to revolutionize IR (PAH) astronomy. As part of a JWST Early Release Science Program (ERS; ID 1288; pdrs4all.org) pypahdb (github.com/pahdb/pyPAHdb) is being developed. Pypahdb is a Python software tool to quickly generate maps of the PAH ionization and large fraction from JWST data.
Information and comprehensive manuals on PAHdb data, models and software can be found at its documentation portal (pahdb.github.io).

Michele Cappellari (University of Oxford)

Overview of the pPXF method and science

I outline the motivation and concepts of the pPXF method. I then give an overview of the main fields of application and science results based on pPXF.

Adam Carnall (Edinburgh University)

Bayesian Analysis of Galaxies for Physical Inference and Parameter EStimation

Bayesian Analysis of Galaxies for Physical Inference and Parameter EStimation (Bagpipes) is a state-of-the-art public Python code for modelling and fitting photometric and spectroscopic observations of galaxies. Used in more than 50 publications over the last two years, Bagpipes is quickly becoming the tool of choice for a wide variety of scientific use cases. A significant innovation of the code is the inclusion of flexible empirical models that can be fitted to spectroscopic data in combination with physical models for galaxy properties. This allows the user to account for systematic uncertainties introduced into the data during the observation and data reduction processes, for example as a result of imprecise sky subtraction and spectrophotometric calibration. The code is highly optimised, and compatible with high-performance parallel computing infrastructure, allowing huge datasets to be processed. In this talk I will introduce Bagpipes, and discuss some of the science highlights to date, focusing on the 1000-hour ESO VANDELS public spectroscopic survey, a uniquely deep high-redshift survey targeting 2000 galaxies at $1 < z < 7$. I will also discuss the upcoming ESO Multi-object optical and Near-infrared Spectrograph (MOONS), which will provide the ability to simultaneously observe 1000 galaxies across a wavelength range from 0.6-1.8 microns when installed on the 8-metre ESO VLT next year. I am a technical working group leader for the 200-night MOONRISE extragalactic GTO programme, which aims to obtain spectroscopy for a million galaxies at cosmic noon ($z \sim 1 - 2$).

Alice Concas (ESO)

Ionised gas outflows at Cosmic Noon: a new physically-motivated method

Massive gas outflows are thought to be “ubiquitous” in star-forming galaxies especially at high-z. To test this scenario we searched for signatures of ionised gas outflows in a sample of main-sequence galaxies observed with KMOS at z=2. We stacked optical rest-frame emission lines (Hβ, [OIII], Hα and [NII]) in different mass bins and sought for gas outflows using a novel, physically motivated method that improves over the widely used, simplistic method of double Gaussian fitting. We compared the observed emission lines with the expectations from a purely rotating disc model, whereby significant deviations are interpreted as a signature of outflows. We found clear evidence for outflows in the most massive, $\log(M\bigstar/M\odot) > 10.8$, AGN-dominated galaxies, suggesting that AGNs may be the primary force behind the gas flows. Surprisingly, at $\log(M\bigstar/M\odot) \leq 9.6$, the observed line profiles are fully consistent with a rotating disc model, indicating that ionised gas outflows in dwarf galaxies might play a negligible role even during the peak of cosmic star-formation activity. Finally, we compared our results with previous findings highlighting the strengths and weaknesses of different methods and their effects on the derived outflows properties.

Dzhuliya Dashtamirova (National Science Foundation)

Bayesian Evidence Analysis Tool

We present the Bayesian Evidence Analysis Tool (BEAT), a Python-based code for measuring and dissecting multi-component emission lines frequently observed in active galactic nuclei (AGN) exhibiting outflowing winds. This tool is designed to analyze large numbers of spectra (i.e. large surveys or IFU spectroscopy) automatically and determine the number of distinct emitting components, and their kinematic parameters, within a given set of emission lines. We also describe possible use cases of BEAT and how to get started with using BEAT to fit your own data. BEAT is available through Github and will continue to be further developed. incorporating input from the astronomical community.

Rebecca Davies (Swinburne University of Technology)

Spatial and Spectral Decomposition of Star Formation, AGN Activity, and Shocks in IFU Data

Star formation (SF) and AGN activity are key drivers of galaxy evolution, but the interplay between these two processes remains one of the most debated topics in modern astrophysics. Large IFU surveys offer the unique possibility of studying the SF-AGN connection in a spatially resolved manner for statistically significant samples of galaxies. However, calculating accurate star formation rates and AGN accretion rates is difficult because HII region and AGN narrow line region gas emit many of the same emission lines. In this talk, I will describe a technique that has been developed to spatially and spectrally separate emission associated with star formation, AGN activity, and shock excitation in integral field observations. The technique makes it possible to accurately map the spatial distribution of emission associated with SF, AGN activity and shocks for a range of key emission lines including Halpha, [OIII], and [SII]. Characterizing star formation and AGN narrow line region morphologies on sub-kiloparsec scales for large samples of galaxies will significantly improve our understanding of key feedback processes including jet-ISM interactions and the impact of outflows on gas and star formation in the host galaxy.

Tanio Diaz-Santos (IA-FORTH, Greece)

CAFE-NG: The Next Generation of the Continuum And Feature Extraction tool

In this talk I will present the Next Generation of the Continuum And Feature Extraction software (CAFE-NG) originally developed by Marshall et al. (2007). CAFE-NG is a spectral fitting code that is being developed by the JWST Early Release Science (ERS) project #1328 team, who will perform a study of the starburst-AGN connection in four low-redshift, merging luminous infrared galaxies. Fully coded in python, the new CAFE-NG is a tool that will allow users to extract and fit MIRI and NIRSpec IFU data. CAFE-NG is able to perform SED decomposition of a large variety of astronomical sources, simultaneously disentangling their infrared dust-continuum and feature emission, including polycyclic aromatic hydrocarbons (PAHs), atomic and molecular emission lines, and dust-absorption features.

In this talk, I will discuss the physical motivation for CAFE-NG's spectral decomposition and present preliminary examples of the tool functionalities based on simulated MIRI-MRS data-cubes generated using well-known nearby star-forming galaxies and AGN.

Vital Fernández (La Serena University, Chile)

LiMe: A Line Measuring library for the chemodynamic treatment of ionized gas.

Thanks to the new generation of instruments, Big Data has become the standard in astronomy. Moreover, the new spectroscopic datasets are providing both large wavelength range and spectral resolution. Using these tools on intense, young, low metallicity star forming regions, we can perform a gas chemodynamic analysis. This is the simultaneous study of the ionized gas chemistry and kinematics. However, labelling, measuring, and storing these Big Data sets can be challenging for any research group. To handle this situation, we present LiMe: A Line Measuring library in Python.
LiMe provides a workflow to find emission lines, measure their fluxes (both integrated in a Monte-Carlo and Gaussian), fit their profiles and store their results (both in individual files or multipage .fits). Regarding the multi-Gaussian fittings, LiMe provides a simple language to constrain parameters from an emission profile parameter: Fixing their values, setting minimum/maximum boundaries, or defining them as a function or inequality of another line parameter. Moreover, the gas kinematics can be imported from one emission to another. In the case of Integral Field Unit data cubes, LiMe provides tools to define spatial masks for different measurements configuration. Finally, interactive plots are provided to check the algorithm inputs/outputs. LiMe is currently in a beta release. However, users are encouraged to check its documentation at lime-stable.readthedocs.io for the pip command installation, examples and the source code.

Rubén García-Benito (Instituto de Astrofísica de Andalucía (IAA-CSIC)

PyJIN: direct method abundances for large surveys

Although auroral lines are weak, the number of spectra containing these lines is increasing considerably thanks to the vast amount of data available from 1D and IFS surveys. PyJIN (金JIN, metal) is a package for the automatic analysis of the physical properties of the gas and estimation of the ionic and total elemental abundances using the direct method. With PyNEB at its core and using as input a list of emission lines fluxes, PyJIN performs a number of complex assumptions and procedures, from proper correction of nebular extinction to the careful selection of lines to estimate densities, critical temperatures, ionic temperatures, ionic abundances, ICFs and elemental abundances. PyJIN has two available analysis modes: Planetary Nebulae and HII region/Galaxies. Although the primary goal is the analysis using the direct method, it includes also a suite of more than a dozen of temperature and metallicity empirical calibrators from the literature as well as physical estimations of the properties of the HII regions, such as masses, number of ionizing photons, star formation rates, etc. PyJIN output results are stored in a multiple HDUs FITS table keeping track of all user input variables and selected atomic data. It comes with a variety of routines to operate on the PyJIN FITS format, from the production of very detailed individual reports per spectra to the output of ready-to-publish latex tables.

ChangHoon Hahn (Princeton University)

Accelerated Bayesian Galaxy SED Modeling using Machine Learning

Spectral Energy Distribution (SED) modeling is essential for galaxy evolution and cosmology to derive physical properties of galaxies, such as their stellar mass, star formation history, and chemical enrichment history, from observations. State-of-the-art SED modeling uses Bayesian inference, which requires sampling a high-dimensional parameter space. They take hundreds of CPU hours to analyze a single galaxy and, thus, are not scalable for the next-generation galaxy surveys. I will present how we can use new techniques in Machine Learning, such as neural emulation and neural posterior estimation, to dramatically accelerate Bayesian SED modeling. I will present how these techniques will be applied to the DESI Bright Galaxy Survey (BGS) to construct the PRObabilistic Value-Added BGS (PROVABGS), which will deliver full posteriors on the physical properties (e.g. stellar mass, star formation rate, metallicity, and age) of over 10 million galaxies out to $z < 0.6$. I will demonstrate the accuracy and precision of PROVABGS and discuss its scientific applications. Lastly, I will present new methods using neural posterior estimators that will accelerate Bayesian SED modeling even further and discuss their application to future observations from JWST.

Stephanie Juneau (NOIRLab)

Elucidating the impact of galaxy substructure on AGN feedback with IFU observations

Despite the tremendous progress made to improve our knowledge of the black hole-galaxy connection, we still have major gaps in our understanding of the role of AGN feedback in driving galaxy evolution. We now routinely find observational signatures of AGN-driven outflows, and we know that this material can entrain and/or heat gas along the way but mysteries remain regarding their actual impact on the host galaxy. I will present a detailed case study of nearby active galaxy NGC 7582 for which we found an important role played by galaxy substructure (namely a ~600 parsec ring structure) in collimating the AGN outflows, possibly shielding the main galaxy disk from AGN feedback. This analysis was possible thanks to exquisite quality IFU observations from VLT/MUSE with >90,000 spaxels spanning a square arcmin field-of-view (8 kpc across for NGC 7582). We used LZIFU to infer and map the stellar and gas kinematics as well as ionized gas properties, clearly distinguishing between the rotating galactic disk and the AGN-photoionized outflow. To enhance the visual interpretation of the datacube, we created animated figures that step through two key spectral regions showing (1) the star-forming knots and the general galaxy rotation; (2) the AGN outflow with its own velocity substructure. While such detailed observations and analyses are currently only feasible for nearby (or lensed) galaxies, they give us a preview of technical feats that we could achieve at higher redshifts with JWST.

Yasha Kaushal (University of Pittsburgh)

Stellar velocity dispersions determine the path: A census of star formation histories of star-forming and quiescent galaxies at 0.6 < z <1 with LEGA-C and Bagpipes

With unprecedented advancements in spectroscopic studies of distant galaxies through large surveys, we can now statistically study their properties when the universe was just a few billion years old (and soon even younger with JWST). The Large Early Galaxy Astrophysics Census (LEGA-C) ESO Public Spectroscopic Survey obtained deep integrated spectra of ~1800 star-forming and ~1200 quiescent galaxies at 0.6 < z < 1.0, selected to be mass-representative above ~ 5 x 1010 $M_{\odot}$. Each galaxy was observed for ~20 hours yielding high fidelity absorption line features even for very dusty and blue galaxies. Essentially all galaxies at this epoch contain stars of age ~< 3 Gyr, in contrast with older massive galaxies today, facilitating robust measurements of the previous generations of star formation. At lookback times of 6 billion years, we constrain the star-formation histories of individual galaxies through spectro-photometric analysis using state-of-the-art parametric Bayesian SED modeling package BAGPIPES. Our results reveal the downsizing trends seen in the local universe - low-mass galaxies have more extended SFHs that peak at later cosmic times compared to high-mass galaxies. More clear trends are seen when galaxies are sorted by stellar velocity dispersions - galaxies with high stellar velocity dispersions (150 km/s < $\boldsymbol{\sigma}$ < 250 km/s) have their peak of star-formation at earlier times (z~2), rising and declining more rapidly (over ~3 Gyrs). In contrast, galaxies with shallower potential wells accumulate their stellar mass at much slower rate and, on average, are still actively forming stars. Although these trends are seen within the full population of galaxies, this is driven largely by the population of star forming galaxies.This census of stellar populations in massive (> 0.3L*) galaxies at half the age of the Universe sets the standard point of comparison for future studies at earlier times with JWST and a broad statistical sampling of star formation during the period immediately following cosmic noon.

Alexandros Maragkoudakis (NASA Ames Research Center)

Linking Characteristics of the Polycyclic Aromatic Hydrocarbon Population with Galaxy Properties: A Quantitative Approach Using the NASA Ames PAH IR Spectroscopic Database

The family of polycyclic aromatic hydrocarbon (PAH) molecules are credited for the prominent emission features in the 3-20 μm spectral range of many astrophysical sources, including galaxies. The emission from PAH molecules has proven to be an excellent diagnostic for probing the local physical conditions of their irradiating sources and surrounding environments. In galaxies, PAH emission has been calibrated and used for the estimation of star formation rates on galaxy-wide and spatially resolved scales, as a tracer of the molecular gas, as well as means to identify active galactic nuclei activity. Moreover, PAH emission has been an important component for modeling the broad-band spectral energy distribution (SED) of galaxies, as their emission can contribute ~20% of a galaxy's total infrared (IR) emission. Utilizing the NASA Ames PAH IR Spectroscopic Database (PAHdb; www.astrochemistry.org/pahdb/), consisting of more than 4,000 PAH spectra, we have performed a detailed study of the PAH component of over 900 Spitzer-IRS galaxy spectra with different nuclear activity classes, in an effort to quantitatively characterize the properties of their PAH populations in terms of size distribution, charge state, and composition. Employing PAHdb models and Python tools (github.com/pahdb/AmesPAHdbPythonSuite) we examined the relationship between the average PAH characteristics and fundamental galaxy properties, further providing estimates for the 3.3 μm PAH band feature not present in Spitzer observations, and ultimately delivering a library of PAH emission templates covering the 3-20 μm that can be utilized by galaxy SED fitting codes.

Eric Martínez-García (CONACYT-INAOE)

Significant issues when fitting spatially resolved star-forming galaxies.

Some important concerns that arise when fitting stellar models to resolved data (i.e., pixel-by-pixel, or spaxel-by-spaxel) of disk galaxies are the following:

(i) The spatial structure of the recovered stellar mass is often different from the expected one.
(ii) The choice of stellar population synthesis models affects the recovered physical characteristics.

The first issue was investigated by Martínez-García et al. (2017). According to their findings, the recovered stellar mass-map of a disk galaxy, obtained by fitting stellar population synthesis models to observations, results in an artificial spatial structure, not a real mass structure, with supposed filaments that spatially coincide with the dust lanes near the spiral arms.

The second issue is mainly due to the fact that stellar population synthesis models from different authors, even with the same input parameters, differ in luminosity at various wavelengths (see, e.g., Martínez-García et al., 2021). This effect becomes more important in the NIR range, at ages around 200 My, where the TP-AGB stars dominate the stellar population luminosity. The TP-AGB star luminosity contribution in disk galaxies may vary with Hubble type. In this talk we will discuss the implications of the above issues for future spectroscopic datasets in the form of IFU datacubes.

Anne Medling (University of Toledo)

LZIFU: the spectral analysis tool for lazy astronomers

We present LZIFU ('LaZy-IFU') — the lazy way to analyze integral field spectroscopy. LZIFU is written in IDL and designed to work with single- or dual-armed spectrographs to simultaneously fit Gaussian profiles to a series of emission lines. Initially, emission lines are masked out and the continuum fit using pPXF and then removed. Then, each emission line is constrained to have the same velocity and velocity dispersion to more accurately fit the fluxes of the weaker emission lines. LZIFU can fit up to three Gaussian components, again constraining the kinematic profiles to match across all emission lines, and can optionally run in a parallelized manner. LZIFU is available at https://github.com/hoiting/LZIFU

Wilfried Mercier (Institut de Recherche en Astrophysique et Planétologie)

MocKinG: a new tool to model galaxy dynamics and mass distribution from integral field spectroscopy data

I will present a set of new tools designed to constrain the distribution of matter in star-forming galaxies using IFS data and high-resolution photometry. I will show how, using CAMEL, we can extract kinematics maps such as flux, velocity field and dispersion maps from gas emission lines. Then, I will show how, using MocKinG kinematics modelling tool, we can model the kinematics of the gas and derive accurate velocity dispersion maps, corrected of beam-smearing and instrumental effects. MocKinG also has the capability to derive 2D mass models by combining various mass components such has stellar bulge, stellar and gaseous disks and dark matter halo to constrain the contribution of each component to the dynamics of galaxies.I will further show how we can use a recently developed pixel-per-pixel SED fitting pipeline to derive resolved stellar mass distributions from multi-band images in the optical in order to constrain stellar mass components in MocKinG, fitting these maps with multi-components models such as a bulge-disk model.Throughout the discussion, I will illustrate each step using MUSE and HST data of galaxies from the MAGIC survey studied in a recent paper where we applied these new tools to study the impact of environment on galaxy evolution.I will further show how those tools can be used either on nearby galaxies observed at high resolution or on high-redshift galaxies as they will be observed by ELTs and JWST.

Camilla Pacifici/Ogle Cami Pacifici / Patrick Ogle

Jdaviz: An interactive visual data analysis tool in the Jupyter platform

Jdaviz (JWST Data Analysis and Visualization) is a Python package developed at the Space Telescope Science Institute to provide GUI-based visualization and interactive analysis capabilities for 1D spectra (Specviz), multi-object spectroscopy (Mosviz), cube data (Cubeviz), and imaging data (Imviz). The tools are designed to work within a Jupyter notebook cell, as a standalone desktop application, or as embedded windows within a website – all with nearly-identical user interfaces. Jdaviz has been designed specifically to support JWST use cases, but can be used for a wide range of astronomical data. We will first give a talk to present what jdaviz is, its capabilities, and the libraries it uses under the hood (e.g., astropy, specutils, glue). We will then demonstrate a few science use cases using Jupyter notebooks. In particular, we will show how to (1) extract moment maps from a datacube with Cubeviz, (2) fit complex models to a datacube, and (3) use Mosviz to estimate source redshifts.

Matilde Mingozzi (STScI)

AGN outflows in ram-pressure stripped galaxies

Galactic outflows are ubiquitously found in local and distant galaxies characterized by AGN activity, possibly having a profound impact on the evolution of their host galaxies and environments. Detailed multi-phase studies play a key role in constraining their properties (e.g., density, energetics, acceleration mechanisms), and thus in providing precious information about the AGN feedback. In this context, we have been carrying out a project aimed at analyzing the kinematics in the central regions of galaxies characterized by AGN activity taken from the GAs Stripping Phenomena in galaxies with MUSE (GASP) sample, exploiting also the complementary information on molecular gas provided by ALMA. These galaxies are affected by ram pressure stripping that removes gas from galaxies in galaxy clusters, due to the pressure exerted by the intergalactic medium on the galaxy interstellar medium. Overall, MUSE data allows us to investigate the kinematics of ionized gas and its content along the galaxy disk through optical emission lines (e.g., [OIII]5007), while ALMA data provides information on the molecular gas through the CO(1-0) and CO(2-1) emission lines. In this talk, I will show the method used to distinguish the outflowing gas in the ionized and molecular phases, using the information from both the spectral fitting and 3D-BAROLO, a tool for fitting 3D tilted-ring models to emission-line data-cubes. Moreover, I will discuss what is the impact of AGN activity on the molecular gas, looking for the presence of molecular outflows and their link with the ionized phase.

Christophe Morisset (Instituto de Astronomia, UNAM)

How Neural Networks can boost nebular analysis

Neural Networks methods have been included to the PyNeb library to speedup the determination of the electronic temperature and density. This allows the user to determine physical and chemical properties from IFU observations, including Monte Carlo process to follow the uncertainties among the pipeline, in a reasonable time (a few seconds instead of hours for the classical version). I will describe the method and show how it can also be used in different contexts.

Ciro Pappalardo (Institute of Astrophysics and Space Sciences – Lisbon)

Stellar age and metallicity of galaxies in spectral synthesis methods

In this talk, I will investigate the limits and the reliability of different spectral synthesis methods in the estimation of the mean stellar age and metallicity, fundamental quantities to determine the assembly history of a galaxy. To address this question, we built a set of realistic simulated spectra containing stellar and nebular emission, degraded them to different signal to noise ratios (S/N), and performed an analysis with three widely used spectral synthesis codes: FADO, STECKMAP, and STARLIGHT.

For S/N >5 the three tools show a large diversity in the results, with median differences in the light-weighted mean stellar age of ~0.1 dexes in FADO and STARLIGHT, while STECKMAP shows a higher value of ~0.2 dexes. Our results imply that when a galaxy enters a phase of high specific star formation rate (sSFR) the neglect of the nebular continuum emission in the fitting process has a strong impact on the estimation of its star formation history when purely stellar fitting codes are used, even in presence of high S/N spectra. The median values of these differences are of the order of 7% (FADO), 20% (STARLIGHT), and 30% (STECKMAP) for light-weighted quantities, and 20% (FADO), 60% (STARLIGHT), and 20% (STECKMAP) for mass-weighted quantities. Our work underlines once more the importance of a self-consistent treatment of nebular emission, which is a foreseeable route towards a reliable determination of the assembly of any high sSFR galaxy at high and low redshift.

Sebastian Sanchez:
Sánchez, Sebastian Francisco; Lacerda, E.; Mejía-Narvaez, A.; Espinosa-Ponce, C.; Lopez, C.; Ibarra-Medel, H.; Camps-Farina, A.; Barrera-Ballesteros, J.K.

Pipe3D, a pipeline for IFS galaxy surveys

We present the most recent results based on Pipe3D, a pipeline tool developed to analysis the spatial resolved stellar population and emission line properties. Previous versions of the pipeline were tested with CALIFA, MaNGA, SAMI and MUSE data (AMUSING++ compilation), using only one SSP-library (GSD156), and a limited set of emission lines (52 galaxies). We introduce a new version of the code fully re-written in Python, that significantly improves the efficiency. In addition we have included different SSP-library analysis and a new set of emission lines (252 in total). We use this new version to analyze the MPL-11 version of the MaNGA dataset (~10,000 galaxies), and we are in the process of reanalyzing the AMUSING++ compilation (~900 galaxies observed with MUSE).

Matthew Selwood (University of Bristol)

Automatic Spectral Analysis of Type 2 AGN with QSFit

QSFit, a Julia language-based automatic AGN spectral fitting software, provides a means to fit and analyse the properties of large samples of unobscured (type-1) AGN optical spectra. Type-1 AGN however, constitute only a portion of the total AGN population therefore we adapt QSFit's fitting routine for the analysis of obscured (type-2) AGN spectra. Our modifications are tested for self-consistency and consistency with other emission line fitting methods through the analysis of a sample of 887 optically selected type-2 AGN spectra from the SDSS presented in Reyes et al. (2008). Results indicate consistency between type-2 AGN emission line measurements made with QSFit and alternative methods and spectral property measurements that are self-consistent with theoretical predictions. Outliers in these consistency checks point towards poor quality spectra and spectra with physically interesting emission line profiles, which has led to the development of specialised QSFit fitting routines for type-2 AGN spectra with double-peaked emission lines and high signal to noise ratios, for which additional components are required.

Elizabeth Tarantino (University of Maryland - College Park)

Modeling Ionized Gas at Low Metallicities: The Wolf-Rayet Emission Nebula N76

Massive stars inject energy and momentum into their surrounding gas, heating and influencing the physical conditions of the interstellar medium (ISM). The goal of this project is to model infrared emission lines from the brightest Wolf-Rayet (WR) emission nebula (N76) in the low metallicity Small Magellanic Cloud (SMC) in order to establish the physical conditions of the ionized gas using mid-infrared Spitzer/IRS and far-infrared Herschel/PACS spectroscopy. Our approach is to model N76 as a roughly spherically symmetric HII region with a WR and O6 star binary system as the ionization source using the photoionization code Cloudy (Ferland et al. 2017). We use the spectral fitting program PAHFIT (Smith et al. 2007) to construct a spatially-resolved image of each MIR emission line. The spatially resolved shape of the emission allows us to constrain properties much more accurately than just using spatially integrated quantities. We construct a Cloudy model with a constant density between n_H = 4 - 16 cm^-3 and a stellar wind-blown cavity. This model reproduces the intensity and shape of most ionized gas emission lines, including [SIII], [SIV], [OIII], [OIV], [NeII], [NeIII], and [NeV]. Our models of N76 show hard ionization fields and some tentative evidence for ionizing photon leakage as diffuse emission around the nebula in the lower ionization lines. This study is a pathfinder for utilizing spatially-resolved MIR data in photoionization models, which JWST will build upon in the future.

Remington Sexton (United States Naval Observatory)

BADASS - An automated spectral fitting pipeline in Python for Galaxies and Quasars.

We present Bayesian AGN Decomposition Analysis for SDSS Spectra (BADASS), an open source automated spectral analysis code designed for automatic detailed fitting of galaxies and quasars, implemented in Python, and designed for the next generation of large-scale surveys. The code simultaneously fits all spectral components, including power-law continuum, stellar line-of-sight velocity distribution (pPXF), Fe II emission, as well as forbidden (narrow), permitted (broad), and outflow emission line features, all performed using Markov chain Monte Carlo to obtain robust uncertainties and autocorrelation analysis to assess parameter convergence. We will discuss recent significant upgrades to BADASS since its debut, which include the capacity to fit high-redshift quasar spectra, improvements to the user-interface, and support for IFU data, as well as current and future projects involving the code.

J.D. Smith (University of Toledo)

PAHFIT at 15 years: The Past, Present, and Future of Mid-Infared Spectral Modeling of Galaxies

The mid-infrared (MIR) emission of galaxies is highly complex. It straddles the varying transition between direct starlight at shorter wavelengths, and re-radiated dust emission at longer wavelengths. The MIR hosts 1) ionic collisional and recombination lines of many species, tracing low excitation gas, star-formation and ionized gas, shocks, and AGN; 2) the fundamental pure rotational emission lines of warm molecular hydrogen; 3) resolved vibrational emission bands of ultra-small PAH dust grains; and 4) highly variable and high-contrast absorption (and sometimes emission) from silicate grains, aliphatic materials, as well as various ices including water. PAHFIT is a tool originally developed for physical decomposition of Spitzer/IRS low-resolution spectra. I'll give a bit of background on the development of PAHFIT, and a brief overview of the wide diversity of astrophysical problems it has been applied to since then, closing with an appeal to join us in our ongoing efforts to adapt and expand the PAHFIT model for the JWST era.

Andrey Vayner (Johns Hopkins University)

Fitting rest-frame UV and optical IFS data with Q3Dfit for JWST

Active galactic nuclei (AGN) often outshine the light from their host galaxies by up to several orders of magnitude at rest-frame ultraviolet to infrared wavelengths. Integral field spectroscopy (IFS) allows to uniquely isolate the AGN emission component from the rest of the host galaxy that can be fit on a spaxel by spaxel basis and subtracted to reveal the extended host galaxy emission. As part of the JWST Early Release Science Program, our team has been developing a tool called "Q3Dfit" that is optimized to perform PSF subtraction for the NIRSpec and MIRI IFS. In addition, the software simultaneously and iteratively fits all extended emission lines from the host galaxy and utilizes pPXF to fit the underlying host galaxy stellar continuum and absorption lines. The Python Q3D toolkit builds on the well-tested IDL software called IFSFIT. We will apply the Q3Dfit software to analyze three quasars observed with JWST at a range of redshifts and contrast levels between the quasar and the host galaxy. I will present and demo our software on rest-frame ground-based optical quasar host galaxy observations demonstrating its capability to remove the bright unresolved quasar emission and detect and analyze the much fainter extended emission from the host galaxy.

Giacomo Venturi (Pontificia Universidad Católica de Chile, Instituto de Astrofísica)

The properties of ionized outflows and the role of low-power, compact jets in local AGN under the integral field eye of VLT/MUSE

Integral field spectroscopic (IFS) observations, by simultaneously mapping and spectrally dissecting large portions of AGN-host galaxies, have revolutionized the way the mechanism of AGN feedback on galaxies - operating through the action of fast gas outflows and jets - can be studied. The capacity to constrain outflow and feedback models has been often plagued by the poor spatial information and deepness of observations, due to instrumental limitations and/or the large distances of the objects.
I will present our analysis and results of VLT/MUSE optical IFS observations of local AGN. The key combination of MUSE capabilities (wide 1'x1' FOV plus complete spectral coverage of the optical-band) and vicinity of the targets (spatial resolutions ~10-100 pc) allowed us to investigate these phenomena at unprecedented detail and completeness of information.
I will illustrate our methods to extract physical, kinematic and excitation properties of ionized outflows from the IFS data. We were then able to compare the gas density, extinction and excitation of outflow vs galaxy disk, measure mass outflow rate and energetics as a function of distance from the AGN and obtain insights on the outflow acceleration mechanisms. Finally, we studied the effect of compact (<1 kpc), low-power (<10^44 erg/s) radio jets on their hosts, finding that they drive turbulent gas motions perpendicular to their propagation direction. In line with recent simulations, our result demonstrates that not only powerful, extended jets but also low-power, compact ones are capable of strongly affecting their host galaxies.

Roger Wesson (University College London)

ALFA: automated line fitting algorithm

I will present my code ALFA (Automated Line Fitting Algorithm), which can rapidly fit deep emission line spectra, individually or in data cubes. It optimises fit parameters for many lines simultaneously using a genetic algorithm, and can operate on spectra of any wavelength range and resolution. It is intended to work with as little user input as possible, but provides a number of options to fine-tune the fitting algorithm for particular cases.

Kyle Westfall (UC Observatories)

The SDSS-IV/MaNGA Data Analysis Pipeline

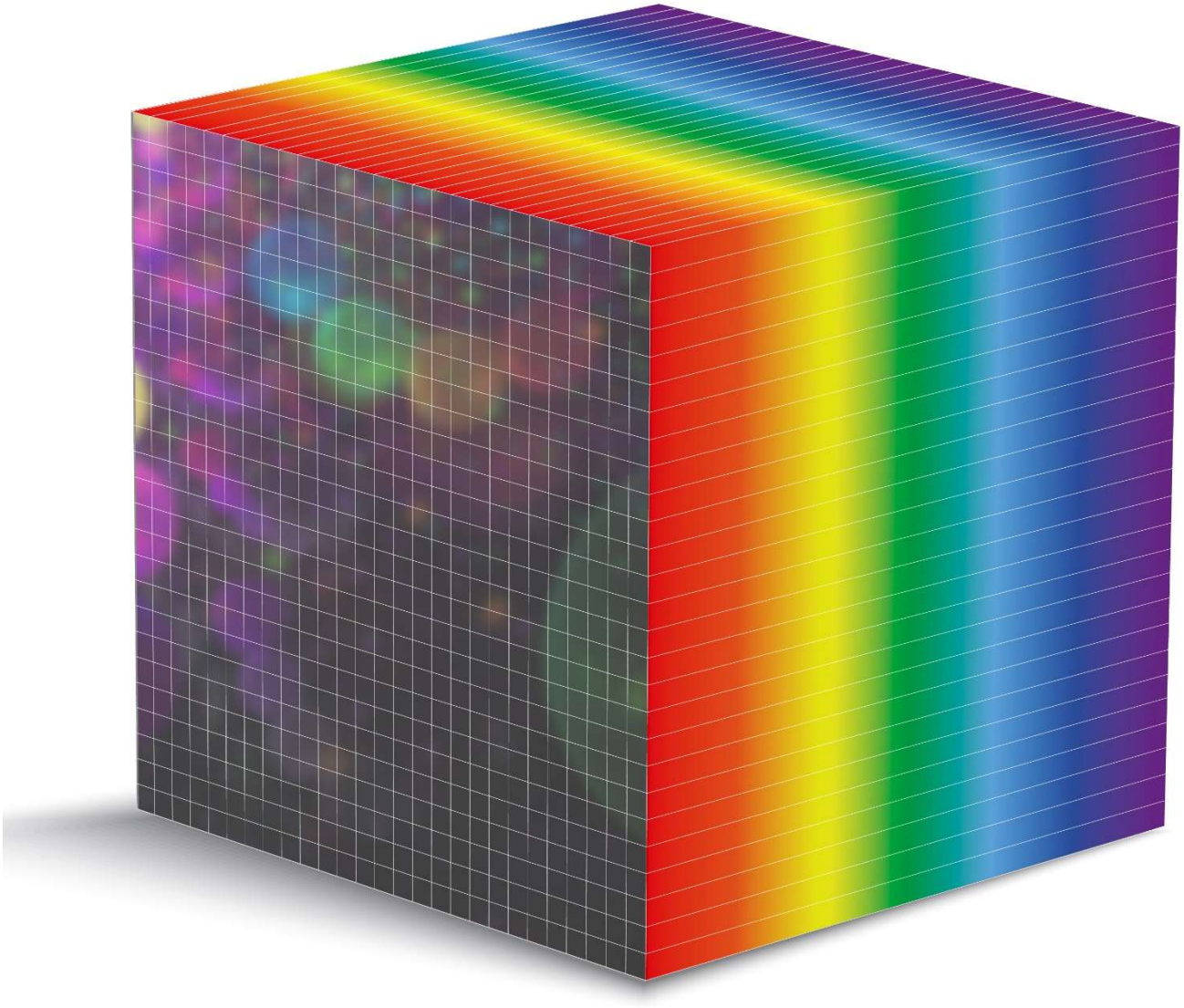
The SDSS-IV/MaNGA Data Analysis Pipeline (MaNGA DAP) is the survey-led software package used to produce high-level science products based on analysis of IFU datacubes from the SDSS-IV/MaNGA Survey. The core modules of the DAP currently focus on measurements of largely model-independent properties. In addition to basic data-quality assessments of the observations, these properties include stellar kinematics, nebular emission-line properties (fluxes and kinematics), and numerous spectral indices (e.g., absorption-line strengths). Although driven by the analysis of the MaNGA data, the DAP has been designed for broader use across a wide range of IFUs. For example, core DAP methods focus on functionality that is independent of the higher-level data format, and its high-level interface provides methods that accommodate its use with datacubes from different observatories. The latter has led to successful analysis of VLT-MUSE observations and should be easily adapted for IFU observations from JWST (MIRI, NIRSpec). Here, I provide an overview of the DAP modules and its output products, as well as summarize its current strengths and weaknesses.

Igor Zinchenko (LMU Munich)

ELF3D: a parallel code for emission line fitting

ELF3D is developed for fitting emission lines in gas spectra. It allows fitting both single emission lines and complex groups of emission lines like blends or projections of multiple objects to the line of sight. The code is written in Python and allows parallel processing of the spaxels/spectra. The code has been applied for processing IFU datacubes from CALIFA and MaNGA surveys and RSS data from The Mitchell Spectrograph (initially known as VIRUS-P).

Poster Presentations

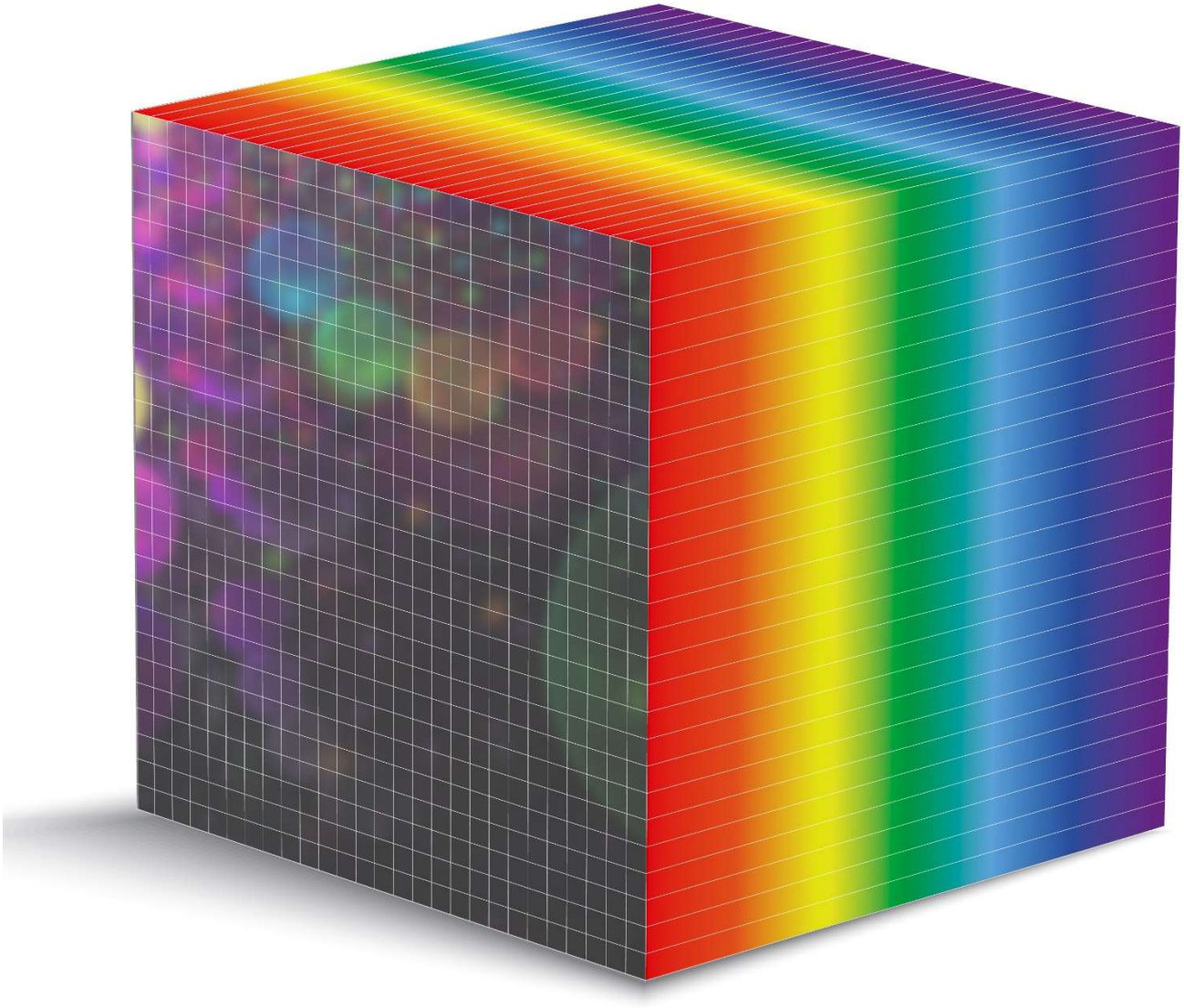


Full Name	Institution	Poster Title
Ali Ahmad Khostovan	Rochester Institute of Technology	Building A Public Spectroscopic Archive of the COSMOS Legacy Field
Paola Alvarez-Hurtado	Instituto de Astronomía, UNAM	Exploring the impact of the star formation in the mass-metallicity relation at global scales
Roberto B. Menezes	Instituto Mauá de Tecnologia	First results of the DIVING3D survey of bright galaxies in the local universe: the mini-DIVING3D sample
Andrew Battisti	Australian National University	The average dust attenuation curve at z~1.3 based on HST grism surveys
Marina Bianchin	Federal University of Santa Maria	The Quasar Feedback survey: Ionized Outflows in type 2 QSOs with MUSE data
Vitor Bootz	UFRGS - Universidade Federal do Rio Grande do Sul	Isolated groups of extremely blue dwarf galaxies
William Bowman	The Pennsylvania State University	Spectral Energy Distribution Fitting with Correlated Flux Uncertainties
Adam Broussard	Rutgers University	Probing Star Formation Feedback via Burstiness in Simulated and Observed Galaxies
Douglas Burke	Center for Astrophysics | Harvard & Smithsonian	Sherpa - looking at spectral fitting from higher energies
Asier Castrillo	University Autonomous of Madrid	Machine learning classification of the ISM in NGC 300
Avinanda Chakraborty	Presidency University	SED Analysis of Broad Emission Line Quasars
Sabyashachi Chattopadhyay	South African Astronomical Observatory	Kinematically probing the evolution of galactic disks
Guilherme Couto	Leibniz Institut for Astrophysics Potsdam (AIP)	VALES Sample: Weak ionized gas outflows in star-forming galaxies at z ~ 0.15 traced with VLT/MUSE
Patrícia da Silva	IAG-USP	The Milky Way morphological twins of the DIVING 3D survey
Subhrata Dey	Astronomical observatory of Jagiellonian University	SED modeling of 11 local luminous infrared galaxies in radio and infrared domains
Antoine Dumont	University of Utah	Surprisingly Strong K-band Dust Emission Found in LLAGNs
Juan Antonio Fernández Ontiveros	Centro de Estudios de Física del Cosmos de Aragón (CEFCA)	IR-based abundances in star forming galaxies
Raúl González Díaz	INAOE/ICE	The challenge of measuring low surface brightness gas emission from IFS data: the DIG case
Alejandro Gorgues Valenciano	Centro de Astrobiología (CAB, CSIC-INTA)	AstroCabTools, data processing and visualization toolset for the Mid-Infrared Instrument
Hector Ibarra-Medel	Universidad de Atacama	The archeological evolution of the AGN host galaxies with MaNGA
Gabriele Ilha	Universidade Federal de Santa Maria	Active Galactic Nuclei signatures in Red Geyser galaxies

Petro Janse van Rensburg	SAAO/UCT	Studying gas flows in the SUNBIRD starburst galaxies and LIRGs using long-slit data
Yifei Jin	ANU	Modeling Nebular Emission-Lines with Messenger Monte-Carlo MAPPINGS V (M^3)
Ho-Hin Leung	University of St Andrews	How much do gas-rich mergers contribute to the local elliptical population? Linking mergers and quenching by studying galaxy chemical evolution
Vladan Markov	PhD	Constraining the ISM properties of early star-forming galaxies using the spectroscopic analysis of carbon lines
Jasleen Matharu	Texas A&M University	Understanding Where Stars Form in Distant Star-Forming Galaxies with Spatially Resolved H-alpha Emission Line Maps from Space-based Slitless Spectroscopy
Elijah Mathews	Pennsylvania State University	Building a More Efficient and Capable SED-Fitting Suite in the Age of JWST
Mohammad-Hassan Naddaf	Center for Theoretical Physics, Polish Academy of Sciences, Warsaw	Explanation of the Low Ionized Broad Emission Lines of AGNs by FRADO Model
Alenka Negrete	Instituto de Astronomía (UNAM)	Highly accreting quasars at low-redshift as standard candles
James Negus	University of Colorado Boulder	Leveraging Integral Field Spectroscopy to Detect Coronal and Broad Line AGN in MaNGA
Valeria Olivares	University of Kentucky	Gas condensation in Brightest Group Galaxies unveiled with MUSE
Swayamtrupta Panda	(1) Laboratorio Nacional de Astrofisica - MCTIC, Itajuba, Brazil; (2) Center for Theoretical Physics, Polish Academy of Sciences, Warsaw, Poland	What drives the Coronal Lines? - Characterizing the forbidden, high-ionization emission regions in a sample of active galactic nuclei
Swayamtrupta Panda	(1) Laboratorio Nacional de Astrofisica - MCTIC, Itajuba, Brazil; (2) Center for Theoretical Physics, Polish Academy of Sciences, Warsaw, Poland	The multi-faceted use of the correlation between the optical Iron and NIR Calcium emission in the Broad-line Regions of Active Galactic Nuclei
Abhishek Paswan	Indian Institute of Astrophysics	Physical processes involved in making dwarf galaxies as LyC leakers or Ly-alpha emitters
Rohan Pattnaik	Rochester Institute of Technology	Automating Extragalactic spectroscopic measurements using Deep Learning
Borja Pérez-Díaz	Instituto de Astrofísica de Andalucía IAA-CSIC	Chemical abundances in the NLR of AGN based on IR emission lines
Ragadeepika Pucha	University of Arizona	Active Black Holes in Dwarf Galaxies from DESI
John R. Weaver	Cosmic Dawn Center, Niels Bohr Institute	Beasts in the Bubbles: Challenges for spectroscopic studies of ultra-luminous star-forming galaxies at cosmic dawn

Chris Richardson	Elon University	Emission Line Diagnostics with JWST and SDSS to Detect Simultaneous IMBH and Stellar Excitation in z~0 Dwarf Galaxies
Fabián Rosales-Ortega	INAOE-Mexico	Gauging the impact of spectral synthesis and emission line fitting methods on IFS gas-phase studies
Fabián Rosales-Ortega	INAOE-Mexico	IFSexplorer: A Python3 visualization tool for integral field spectroscopy (IFS) data
Namrata Roy	University of California Santa Cruz	Feeding and feedback via large scale AGN driven winds in nearby elliptical galaxies
Mason Ruby	University of Memphis	Kinematic analysis of the Dual AGN in Mrk 266
David Rupke	RHODES COLLEGE	IFSFIT: A flexible, IDL-based fitter for IFS data of galaxies
Jorge Sarrato	IAC	Homogeneous characterization of 70 AGN host galaxies
Peter Scicluna	ESO Chile	AMPERE: Fitting heterogeneous data with imperfect models
Aleksandra Solarz	ESO	Spectroscopic investigation of dust-enshrouded AGN hosted by z<0.2 galaxies
Tjitske Starkenburg	Northwestern University	Apples-to-apples comparisons of theoretical and observed galaxy populations: how much can we learn?
Kateryna Vovk	Main Astronomical Observatory of NAS of Ukraine	The new AGN search in SDSS «MaNGA» survey
Benedetta Vulcani	INAF-OaPD	Integral field spectroscopy allows us to distinguish among the different physical mechanisms affecting galaxies in the different Environments
Sandra Zamora	Theoretical Physics Department, Universidad Autónoma de Madrid, Spain	Measurement of radial velocities and velocity dispersions in Python using Tonry & Davis Method
Peixin Zhu	Australian National University	A New Model and Strong Line Diagnostics of Active Galactic Nucleus
Zhuyun Zhuang	Caltech	New insights on the mass-metallicity relation of local star-forming galaxies from KCWI

Participant List



Participants

Full name	Email Address	Affiliation
Nouran Abdelhamid	nouran.abdelhamid@nriag.sci.eg	Researcher Assistant At National Research Institute Of Astronomy And Geophysics
Abdurro'uf Abdurro'uf	abdurrouf@asiaa.sinica.edu.tw	Academia Sinica Institute of Astronomy and Astrophysics
Valentina Abril Melgarejo	vabrilmelgarejo@stsci.edu	STScI
Yasin Abul-Huda	yabulhuda@stsci.edu	NIRSpec FOT
Nathan Adams	nathan.adams@manchester.ac.uk	University of Manchester
S M Rafee Adnan	rafee.adnan.21@gmail.com	Shahjalal University of Science and Technology, Sylhet
Bhavna Adwani	Bhavna.adwani@e-campus.uab.cat	Universitat Autonoma de Barcelona
Jose Afonso	jafonso@iastro.pt	Instituto de Astrofísica e Ciências do Espaço - Univ. Lisbon
Christopher Agostino	cjagosti@iu.edu	Indiana University
Jasmir Aguilera	jasmiraguilera@gmail.com	Universidad Nacional Autónoma de Nicaragua, Managua.
Erick Jasmir Aguilera Ramos	jasmiraguilera.r@gmail.com	Unan, Managua
Syeda Lammim Ahad	ahad@strw.leidenuniv.nl	Leiden Observatory
Stacey Alberts	salberts@email.arizona.edu	University of Arizona
Belen Alcalde Pampliega	belen.alcalde@eso.org	ESO
Amruth Alfred	h1352888@connect.hku.hk	University of Hong Kong
Davi Almeida de Oliveira	dadoalm@gmail.com	Ione Almeida de Oliveira
Almudena Alonso Herrero	aalonso@cab.inta-csic.es	Centro de Astrobiología, CSIC-INTA
Paola Alvarez-Hurtado	palvarez@astro.unam.mx	Instituto de Astronomía, UNAM
Amirnezam Amiri	amirnezam.amiri@unfi.it	University of Florence
Tonima Tasnim Ananna	tonima.ananna@dartmouth.edu	Dartmouth College
Irham Taufik Andika	andika@mpia.de	Max Planck Institute for Astronomy, Heidelberg
Marianna Annunziatella	mannunziatella@cab.inta-csic.es	Astrobiology center
Ville Antila	vvanti@utu.fi	Turku University
Yordanka Apostolovski	yordanka.apostolovski@gmail.com	Universidad de Valparaíso
Archana Aravindan	aarav005@ucr.edu	University of California, Riverside
Karla Z. Arellano-Córdova	kzarellano@austin.utexas.edu	The University of Texas at Austin
Lee Armus	lee@ipac.caltech.edu	Caltech/ipac
Louisa Arnell	louisaarnell@hotmail.com	University of Turku
Catarina Aydar	catarina.aydar@gmail.com	University of São Paulo
Ashraf Ayubinia	a.ayubinia@gmail.com	University of Science and Technology of China
Roberto B. Menezes	roberto.menezes@maua.br	Instituto Mauá de Tecnologia (IMT)
William Baker	wb308@cam.ac.uk	University of Cambridge
Barkha Yakub Bale	barkha.bale@ff.stud.vu.lt	Vilnius University
Scott Barrows	robert.barrows@colorado.edu	University of Colorado Boulder
Andrew Battisti	andrew.battisti@anu.edu.au	Australian National University
Damien Beaulieu	damien.beaulieu.1@ulaval.ca	Université Laval
Meriem Behiri	meriembehiri96@gmail.com	SISSA
Francesco Belfiore	francbelf@hotmail.it	INAF - Arcetri
Sirio Belli	sirio.belli@cfa.harvard.edu	Center for Astrophysics, Harvard and Smithsonian
Enrica Bellocchi	enrica.bellocchi@gmail.com	Centro de Astrobiología (CSIC/INTA)
Misty Bentz	bentz@astro.gsu.edu	Georgia State University
Caroline Bertemes	c.bertemes@uni-heidelberg.de	Heidelberg University
Asnakew Bewketu Belete	asnakew@chalmers.se	Chalmers Institute of Technology

Harshitha Bhat	bhat@ph1.uni-koeln.de	Max Planck Institute for Radio Astronomy & University of Cologne
Marina Bianchin	marina.bianchin@acad.ufsm.br	Universidade Federal de Santa Maria (UFSM)
Bahar Bidaran	bidaran23@gmail.com	Universität Heidelberg - Astronomisches Rechen-Institut
Melissa Bierschenk	mbiersch@gmu.edu	George Mason University
Luc Binette	lbinette@astro.unam.mx	Instituto de Astronomía, UNAM
Laura Bisigello	laura.bisigello@gmail.com	Università degli studi di Padova
Adrian Bittner	adrian.bittner@ymail.com	European Southern Observatory
Dmitry Bizyaev	dmbiz@apo.nmsu.edu	New Mexico State University
Christiaan Boersma	Christiaan.Boersma@sjsu.edu	NASA Ames Research Center/SJSURF
Nina Bonaventura	nina.bonaventura@nbi.ku.dk	ESA / Cosmic Dawn Center
Leindert Boogaard	boogaard@mpia.de	Max Planck Institute for Astronomy
Vitor Bootz	vitorbootz@gmail.com	UFRGS - Universidade Federal do Rio Grande do Sul
Kit Boyett	kit.boyett@unimelb.edu.au	University of Melbourne
Daniela Breitman	daniela.breitman@sns.it	SNS
Brescia Brescia	massimo.brescia@inaf.it	INAF
Adam Broussard	adamcbroussard@physics.rutgers.edu	Rutgers University
Douglas Burke	dburke@cfa.harvard.edu	Center for Astrophysics | Harvard & Smithsonian
Bea Marie Cajandig	bmcajandig@rtu.edu.ph	Rizal Technological University
Rosa Calvi	rcalvi@iac.es	Instituto de Astrofisica de Canarias
Raoul Canameras	rcanameras@mpa-garching.mpg.de	MPA Garching
Jenna Cann	jenna.cann@nasa.gov	USRA/GSFC
Mariana Cano-Diaz	mcano@astro.unam.mx	Instituto de Astronomia UNAM
Michele Cappellari	michele.cappellari@physics.ox.ac.uk	University of Oxford
Adam Carnall	adamc@roe.ac.uk	Edinburgh University
Rodrigo Carrasco	rodrigo.carrasco@noirlab.edu	NSF's NOIRLab/Gemini Observatory
Quinn Casey	qocasey@wisc.edu	University of Wisconsin-Madison
Letizia Cassara'	letizia.cassara@inaf.it	INAF-IASF Milano, Italy
Marco Castellano	marco.castellano@inaf.it	Inaf - Osservatorio Astronomico Di Roma
Asier Castrillo Varona	asier.castrillo@uam.es	Universidad Autónoma de Madrid
Maria Laura Ceccarelli	laura.ceccarelli@unc.edu.ar	IATE - OAC
Avinanda Chakraborty	avinanda.rs@presiuniv.ac.in	Presidency University
Vassilis Charmandaris	vassilis@physics.UoC.gr	Univ. of Crete & FORTH
Sabyasachi Chattopadhyay	sabyasachi@saao.ac.za	South African Astronomical Observatory
Xiaoyang Chen	xiaoyang.chen@nao.ac.jp	NAOJ
Chien-Ting Chen	chien-ting.chen@nasa.gov	NASA MSFC/USRA
Yuguang Chen	yugchen@ucdavis.edu	University of California, Davis
Christopher Ciccone	crciccone90@gmail.com	University of Maryland
Luis Colina	colina@cab.inta-csic.es	Centro de Astrobiología (CAB, CSIC)
Alice Concas	alice.concas@eso.org	ESO
Guilherme Couto	gcouto@aip.de	AIP Potsdam
Isabella Cox	igc5972@rit.edu	Rochester Institute of Technology
Giovanni Cresci	gcresci@arcetri.astro.it	INAF - Osservatorio di Arcetri
Mirko Curti	mc2041@cam.ac.uk	University of Cambridge
Patrícia Da Silva	p.silva2201@gmail.com	IAG-USP
Luiz da Silva Lima	luiz_15_51@hotmail.com	Universidade Cidade de São Paulo
Y.Sophia Dai	ydai@nao.cas.cn	NAOC
Ruth Daly	rdaly@psu.edu	Penn State University
Natacha Dametto	natachazanon@gmail.com	Instituto de Astrofisica de Canarias
Ashkbiz Danehkar	ashkbiz.danehkar@gmail.com	University of Michigan

Soumyadeep Das	s.das2@herts.ac.uk	University of Hertfordshire
Dzhuliya Dashtamirova	dashtamirova@stsci.edu	Space Telescope Science Institute
Ieva Davalgaitė	ieva.davalgaite@helsinki.fi	University of Helsinki
Rebecca Davies	rdavies@swin.edu.au	Swinburne University of Technology
Gisella De Rosa	gderosa@stsci.edu	STScI
Janayna De Souza Mendes	janamendesfsc@gmail.com	UFSC
Kellie De Vos	ppykd1@nottingham.ac.uk	University of Nottingham
Daniel Delaney	ddelaney2@alaska.edu	University of Alaska Fairbanks
Ivan Delvecchio	ivan.delvecchio@inaf.it	INAF-OA Brera
Kritartha Dey	Kritartha98dey@gmail.com	Indian Institute of Technology (Indian School Of Mines) Dhanbad
Subhrata Dey	sdey@oa.uj.edu.pl	Jagiellonian University
Gonzalo Diaz	cgonzadiaz@gmail.com	Observatorio Astronómico de Córdoba - CONICET
Anastasio Díaz-Sánchez	anastasio.diaz@upct.es	Universidad Politécnica de Cartagena
Laura Duffy	lrd48@psu.edu	Pennsylvania State University
Chetna Duggal	duggalc@myumanitoba.ca	University of Manitoba
Antoine Dumont	antoine.dumont.neira@hotmail.com	University of Utah
Nicholas Earl	nmearl2@illinois.edu	University of Illinois at Urbana-Champaign
Bethan Easeman	be329@bath.ac.uk	University of Bath
Rasha Eldaly	rasha.samir@nriag.sci.eg	National Research Institute of Astronomy and Geophysics
Mike Eracleous	mxe17@psu.edu	The Pennsylvania State University
Donaji Esparza Arredondo	dcaesparza@gmail.com	IRyA, UNAM
Juan Espejo	jespejosalcedo@swin.edu.au	Swinburne University of Technology
Vital Fernández	vital.fernandez@userena.cl	Universidad de La Serena
Juan Antonio Fernández Ontiveros	j.a.fernandez.ontiveros@gmail.com	Centro de Estudios de Física del Cosmos de Aragón (CEFCA)
Anna Ferre-Mateu	anna.ferre@iac.es	Instituto de Astrofisica de Canarias
Carolina Finlez	cfinlez@astro.uc.cl	Pontificia Universidad Católica de Chile
Alexis Finoguenov	alexis.finoguenov@helsinki.fi	Helsinki University
Veronica Firpo	veronica.firpo@noirlab.edu	Gemini Observatory/Noirlab
Travis Fischer	tfischer@stsci.edu	STScI
Dulying Johandra Fitoria Meléndez	djohammelendez008@gmail.com	UNAN, Managua
Benjamin Floyd	bfloyd@mail.umkc.edu	University of Missouri–Kansas City
Sophia Flury	sflury@umass.edu	University of Massachusetts Amherst
Rafael Fragozo	larrazabalr@gmail.com	Independiente
Seiji Fujimoto	fujimoto@nbi.ku.dk	The Cosmic Dawn Center
Marco Fumana	marco.fumana@inaf.it	INAF-IASF Milano
Aniket Ganguly	aniketganguly.slg@gmail.com	INSTITUTE OF SCIENCE, BANARAS HINDU UNIVERSITY
Tianmu Gao	tianmugao.astro@gmail.com	Beijing Normal University
Macarena Garcia del Valle Espinosa	macarena.garciavalle@ed.ac.uk	University of Edinburgh
Rubén García-Benito	rgb@iaa.es	Instituto de Astrofísica de Andalucía (IAA-CSIC)
Ismael Garcia-Bernete	ismael.garciabernete@physics.ox.ac.uk	University of Oxford
Begoña García-Lorenzo	begona.garcia@iac.es	Institito de Astrofísica de Canarias
Gaia Gaspar	gaiagaspar@gmail.com	Observatorio Astronómico de Cordoba
Asrate Gaulle	asrateg@du.edu.et	Dilla University
Liv Gaunt	olivia.gaunt@tufts.edu	Tufts University
Anna Gavalas	Anna_gavalas@hotmail.com	Attendee
Eric Gawiser	gawiser@physics.rutgers.edu	Rutgers University

Junqiang Ge	jqge@nao.cas.cn	NAOC
Koshy George	koshy.george@physik.lmu.de	Ludwig Maximilians University
Tilahun Getachew	tilahun85@gmail.com	ETHIOPIAN SPACE SCIENCE AND TECHNOLOGY INSTITUTE
German Gimeno	german.gimeno@noirlab.edu	Gemini Observatory, NSF's NOIRLab
Aishwarya Girdhar	aishwarya.girdhar@eso.org	European Southern Observatory, Munich
Raúl Gonzalez Diaz	raulghuelma@gmail.com	INAOE
Kaustav Dipta Goswami	kaustavgoswami.kg@gmail.com	Universität Hamburg
Olivia Greene	oliviaallegragreene@gmail.com	Vanderbilt University
Norman Grogin	nagrogin@stsci.edu	Space Telescope Science Institute
Brent Groves	brent.groves@uwa.edu.au	ICRAR-UWA
Miriam Gudiño Yáñez	miriamegy@gmail.com	IA-Ensenada, UNAM
Guillermo Günthardt	guillermo.gunthardt@unc.edu.ar	Astronomical Observatory of Córdoba, UNC.
Kriti Kamal Gupta	kriti0706@gmail.com	Universidad Diego Portales, Santiago
Shashikant Gupta	shashikant.gupta@aalto.fi	Aalto University
Lutz Haberzettl	lutz.haberzettl@louisville.edu	University of Louisville
ChangHoon Hahn	changhoon.hahn@princeton.edu	Princeton University
Pat Hall	phall@yorku.ca	York University
Tim Hamilton	thamilton@shawnee.edu	Shawnee State University
Andtas Haris-Kiss	andras.haris-kiss@helsinki.fi	University of Helsinki
Chris Harrison	christopher.harrison@newcastle.ac.uk	Newcastle University
Takuya Hashimoto	hashimoto.takuya.ga@u.tsukuba.ac.jp	University of Tsukuba
Nina Hatch	nina.hatch@nottingham.ac.uk	University of Nottingham
Matthew Hayes	matthew@astro.su.se	Stockholm University
Laura Hermosa-Muñoz	lhermosa@iaa.es	Instituto de Astrofísica de Andalucía - CSIC
Pascale Hibon	phibon@eso.org	ESO
Erin Hicks	ekhicks@alaska.edu	University of Alaska Anchorage
Yasaman Homayouni	yhomayouni@stsci.edu	STScI
Munira Hoosain	munira.hoosain1996@gmail.com	University of Cape Town
Krzysztof Hryniewicz	krzysztof.hryniewicz@ncbj.gov.pl	National Centre for Nuclear Research
Taylor Hutchison	aibhleog@tamu.edu	Texas A&M University
Narae Hwang	nhwang@kasi.re.kr	Korea Astronomy and Space Science Institute (KASI)
Hector Javier Ibarra-Medel	hjibarram@gmail.com	University of Atacama
Eugene Idogbe	eugeneidogbe23@gmail.com	NASRDA- Centre for Basic Space Science
Tuba Ikiz	tubaaaikiz@gmail.com	Atatürk University
Yuzo Ishikawa	yishika2@jhu.edu	Johns Hopkins University
Luca Izzo	Luca.izzo@nbi.ku.dk	University of Copenhagen
Vikram Kumar Jaiswal	vkj@cft.edu.pl	Center for Theoretical Physics of the Polish Academy of Sciences
Priyanka Jalan	priyanka@aries.res.in	Aryabhatta Research Institute of Observational Sciences
Bethan James	bjames@stsci.edu	STScI
Petro Janse van Rensburg	petro@saao.ac.za	SAAO/UCT
Vivek Kumar Jha	vivekjha.aries@gmail.com	ARIES, Nainital
Xihan Ji	xji243@uky.edu	University of Kentucky
Zhiyuan Ji	zhiyuanji@astro.umass.edu	University of Massachusetts Amherst
Linhua Jiang	jiangKIAA@pku.edu.cn	Peking University
Yifei Jin	yifei.jin@anu.edu.au	ANU
Logan Jones	lojones@stsci.edu	STScI
Regina Jorgenson	rjorgenson@mariamitchell.org	Maria Mitchell Observatory
Piyush Joshi	joshipiyush.uk@gmail.com	Department of Physics, Tezpur University

Ravi Joshi	ravi.joshi@iiap.res.in	Indian Institute of Astrophysics
Stephanie Juneau	stephanie.juneau@noirlab.edu	NOIRLab
Monika I. Jurkovic	mojur@aob.rs	Astronomical Observatory of Belgrade, Belgrade, Serbia
Mary Kaldor	mek5752@psu.edu	Pennsylvania State University
Jeyhan Kartaltepe	jeyhan@astro.rit.edu	Rochester Institute of Technology
Maija Kaseva	mekase@utu.fi	University of Turku
Shai Kaspi	shaik@tauex.tau.ac.il	Tel Aviv University
Susan Kassin	kassin@stsci.edu	STScI
Yasha Kaushal	yak39@pitt.edu	University Of Pittsburgh
Kabelo Kesebonye	kablokes@rocketmail.com	University of Kwa-Zulu Natal
Prachi Khatri	pkhatri@astro.uni-bonn.de	Argelander Institute for Astronomy, University of Bonn
Viraja Khatu	vkhatu@uwo.ca	The University of Western Ontario
Ali Ahmad Khostovan	akhostov@gmail.com	Rochester Institute of Technology
Gourav Khullar	gkhullar@uchicago.edu	University Of Chicago
Keunho Kim	kim2k8@ucmail.uc.edu	University of Cincinnati
Hwihyun Kim	hwihyun.kim@noirlab.edu	Gemini Observatory/NSF's NOIRLab
Eeli Kinnunen	eeli.m.kinnunen@utu.fi	University of Turku
Allison Kirkpatrick	akirkpatrick@ku.edu	University of Kansas
Anne Klitsch	anne.klitsch@nbi.ku.dk	DARK, Niels Bohr Institute, University of Copenhagen
Diana Klutse	dianasmoke1@gmail.com	University of Kwazulu-Natal-Natal
Niilo Koivisto	nieeko@utu.fi	University of Turku
Tutku Kolcu	T.Kolcu@2020.ljmu.ac.uk	Liverpool John Moores University
Wolfram Kollatschny	wkollat@astro.physik.uni-goettingen.de	Institute for Astrophysics, Goettingen University
Jacob Kosowski	jacob.kosowski@helsinki.fi	University of Helsinki
Rubina Kotak	Rubina.kotak@utu.fi	University of Turku
Daria Kozlova	kozlovadaria@list.ru	Ural Federal University
Szymon Kozlowski	simkoz@astrouw.edu.pl	Astronomical Observatory, University of Warsaw
Olga Kuhn	okuhn@lbto.org	Large Binocular Telescope Observatory
Nimisha Kumari	kumari@stsci.edu	Space Telescope Science Institute
Valentina La Torre	valentina.la_torre@tufts.edu	Tufts University
Alvaro Labiano	alabiano@cab.inta-csic.es	Telespazio UK for ESA
Thomas Lai	shaoyu@ipac.caltech.edu	Caltech/IPAC
Ronaldo Laishram	ronaldolaishram@astr.tohoku.ac.jp	Tohoku University
Yash Lapasia	yash.lapasia@gmail.com	Donostia International Physics Centre (DIPC) (Most Recent affiliation)
David Law	dlaw@stsci.edu	STScI
Huynh Anh Le	lha@ustc.edu.cn	Department of Astronomy, University of Science and Technology of China
Denis Leahy	leahy@ucalgary.ca	University of Calgary
Mason Leist	mason.leist@utsa.edu	University of Texas at San Antonio
Ari Leppälä	ari.leppala@helsinki.fi	University of Helsinki
Sarah Leslie	leslie@strw.leidenuniv.nl	Leiden Observatory
Ho-Hin Leung	hhl1@st-andrews.ac.uk	University of St Andrews
Arsen Levitskiy	arsen15@connect.hku.hk	Student
Juno LI	junolee@connect.hku.hk	The University of Hong Kong
Wenxiu Li	wenxiuli@pku.edu.cn	KIAA, PKU
Jing Li	jing.li@uni-heidelberg.de	Heidelberg University

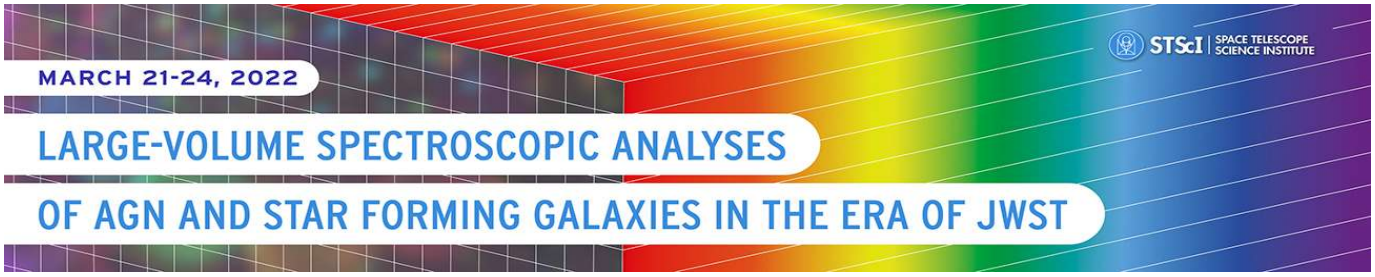
Jamie Lin	jlin20@tufts.edu	Tufts Physics and Astronomy
Weizhe Liu	oscarlwz@gmail.com	University of Maryland
Honghui Liu	hhliu19@fudan.edu.cn	Fudan University
Devang Liya	liyadevang@protonmail.com	Indian Institute of Science Education and Research Mohali
Mario Llerena	mario.llerena@userena.cl	Universidad de La Serena
Tobias Looser	tjl54@cam.ac.uk	Kavli Institute for Cosmology
Enrique Lopez Rodriguez	elopezrodriguez@stanford.edu	KIPAC/Stanford
Ángel López-Sánchez	Angel.Lopez-Sanchez@mq.edu.au	Australian Astronomical Optics, Macquarie University, Australia
Ilani Loubser	Ilani.loubser@nwu.ac.za	North-West University
Yuanze Luo	yluo37@jhu.edu	Johns Hopkins University
Jianwei Lyu	jianwei@email.arizona.edu	University of Arizona
Gabriel Maheson	gabriel.maheson@gmail.com	University of Cambridge
Antoine Mahoro	antoine@saao.ac.za	South African Astronomical Observatory
Vincenzo Mainieri	vmainier@eso.org	Eso
Matt Malkan	malkan@astro.ucla.edu	UCLA
Allison Man	aman@phas.ubc.ca	UBC
Chiara Mancini	chiara.mancini@inaf.it	INAF-IASF Milan
Kameswara Bharadwaj Mantha	manth145@umn.edu	University of Minnesota
Alexandros Maragkoudakis	maragkoudakis.alex@gmail.com	NASA Ames Research Center
Danilo Marchesini	danilo.marchesini@tufts.edu	Tufts University
Alessandro Marconi	alessandro.marconi@unifi.it	Department of Physics & Astronomy, University of Florence
Vladan Markov	vladan.markov@sns.it	Scuola Normale Superiore, Piazza dei Cavalieri 7, 56126 Pisa, Italy
Isabel Marquez	isabel@iaa.es	IAA-CSIC
Cemile Marsan	cemilemarsan@gmail.com	York University
Madeline Marshall	Madeline.Marshall@nrc-cnrc.gc.ca	NRC Herzberg
Mary Loli Martínez Aldama	marylolimx@gmail.com	Universidad de Chile
Mariela Martinez Paredes	mariellauriga@gmail.com	KASI
Eric E. Martínez-García	martinezgarciaeric@gmail.com	CONACYT-INAOE
Nicholas Martis	nicholas.martis@smu.ca	St. Mary's University, NRC Herzberg
Damián Mast	damianmast@unc.edu.ar	Córdoba Observatory
Elijah Mathews	stsci@elijahmathews.com	Pennsylvania State University
Barbara Mazzilli Ciraulo	barbara.mazzilli-ciraulo@observatoiredeparis.psl.eu	LERMA, Observatoire de Paris
Bradlee McIntosh	b-mcintosh@onu.edu	Ohio Northern Unversity
Anne Medling	anne.medling@utoledo.edu	University of Toledo
Beena Meena	bmeena@astro.gsu.edu	Georgia State University
Kalyani Chaitnya Kumar Mehta	cmkalyani5555@gmail.com	Tuebingen University
Marcio Melendez	melendez@stsci.edu	STScI
Wilfried Mercier	wilfried.mercier@irap.omp.eu	Institut de Recherche en Astrophysique et Planétologie (IRAP)
Matilde Mingozzi	mmingozzi@stsci.edu	STScI
Bryan Miranda	bryan11245@gmail.com	CHRIST ACADEMY INSTITUTE FOR ADVANCED STUDIES, BANGALORE 560083, INDIA
Moses Mogotsi	m.mogotsi@saao.nrf.ac.za	SAAO, SALT
Alexei Moiseev	moisav@gmail.com	Special Astrophysical Observatory of Russian Academy of Sciences

Sandy Morais	Sandy.Morais@astro.up.pt	Instituto de Astrofísica e Ciências do Espaço
Marcela Janine Morillo Acosta	lunamjma@gmail.com	Universidad Nacional de Cordoba
Christophe Morisset	chris.morisset@gmail.com	Instituto de Astronomia, UNAM
Amin Mosallanezhad	mosallanezhad@xjtu.edu.cn	Xi'an Jiaotong University
Verónica Motta	veronica.motta@uv.cl	Universidad de Valparaíso
Meenakshi Moun	mounmeenakshi@iucaa.in	Inter University Center for Astronomy and Astrophysics, Pune, India
Celia Mulcahey	celia.mulcahey@gmail.com	Maria Mitchell Observatory
Alejandro Miguel Munguía-Córdova	Amunguia@astro.UNAM.mx	Instituto de Astronomía, Universidad Nacional Autónoma de México
Mohammad-Hassan Naddaf	naddaf@cft.edu.pl	Center for Theoretical Physics, Polish Academy of Sciences, Warsaw
Themiya Nanayakkara	wnanayakkara@swin.edu.au	Swinburne University of Technology
Payel Nandi	payel.nandi@iiap.res.in	Indian Institute of Science, Indian Institute of Astrophysics
Kalina Nedkova	Kalina.nedkova@tufts.edu	Tufts University
Alenka Negrete	alenka@astro.unam.mx	Instituto de Astronomía - UNAM
James Negus	james.negus@colorado.edu	University of Colorado Boulder
Qingling Ni	qingling1001@gmail.com	The University of Edinburgh
James Nianias	nianias@hku.hk	The University of Hong Kong
Martin W. Ochmann	mochmann@astro.physik.uni-goettingen.de	Astronomical Institute (Bochum), Institute for Astrophysics (Göttingen)
Mary Ogborn	mko5309@psu.edu	Pennsylvania State University
Patrick Ogle	pogle@stsci.edu	STScI
Gabriel Oio	gabrieloio@unc.edu.ar	IATE
Valeria Olivares	valeria.olivares@uky.edu	University of Kentucky
Celso B. Oliveira Junior	cbo_jr@hotmail.com	Univap
Christopher Onken	christopher.onken@anu.edu.au	ANU
Masafusa Onoue	monoue@icloud.com	KIAA/Kavli IPMU
Roisín O'Rourke Brogan	rbrogan@aip.de	The Leibniz Institute for Astrophysics Potsdam
René A. Ortega-Minakata	r.ortega@irya.unam.mx	IRyA UNAM
Natalia Osorio Clavijo	n.osorio@irya.unam.mx	Instituto de Radioastronomía y Astrofísica (IRyA)
Ziwei Ou	ouziwei.astro@outlook.com	Sun Yat-sen University
Camilla Pacifici	cpacifici@stsci.edu	STScI
Eliana Palazzi	eliana.palazzi@inaf.it	INAF/OAS Bologna
Richard Pan	richard.pan@tufts.edu	Tufts University
Swayamtrupta Panda	panda@cft.edu.pl	Center for Theoretical Physics, Polish Academy of Sciences, Warsaw
Shivangi Pandey	shivangi101096@gmail.com	Aryabhatta Research Institute of Observational Sciences, Nainital.
Ciro Pappalardo	ciro@oal.ul.pt	Institute of Astrophysics and Space Sciences
Abhishek Paswan	paswanabhishek@gmail.com	Indian Institute of Astrophysics (IIA), Bengaluru, India
Rohan Pattnaik	rp2503@rit.edu	Rochester Institute of Technology
Anna Payne	avpayne@hawaii.edu	Institute for Astronomy, University of Hawaii
Borja Pérez-Díaz	bperez@iaa.es	Instituto de Astrofísica de Andalucía IAA-CSIC
Andreea Petric	apetric@stsci.edu	Space Telescope Science Institute
Kedar Phadke	kphadke2@illinois.edu	University of Illinois Urbana Champaign
Rafael Pignata	rafael.pignata@unc.edu.ar	Observatorio Astronómico de Córdoba
Jason Pinkney	j-pinkney@onu.edu	Ohio Northern University
Artem Poliszczuk	artem.poliszczuk@gmail.com	National Centre for Nuclear Research
Ava Polzin	ava.polzin@yale.edu	Yale University

Luka Popovic	lpopovic@aob.rs	Astronomical Observatory, Belgrade
Malte Probst	malteandres.probst@stud.uni-goettingen.de	Institut für Astrophysik, University of Göttingen
Nikolaus Prusinski	nik@astro.caltech.edu	California Institute of Technology
Ragadeepika Pucha	rpucha@email.arizona.edu	University of Arizona
Yu Qiu	yuqiu@pku.edu.cn	KIAA-PKU
Salvatore Quai	squai@uvic.ca	University of Victoria
Mario Radovich	mario.radovich@inaf.it	Istituto Nazionale di Astrofisica
Sandra Raimundo	raimundo@astro.ucla.edu	UCLA / Univ. Copenhagen / Univ. Southampton
Tahereh Ramezani	Taherehramezani7@gmail.com	PhD student
Bindu Rani	binduphysics@gmail.com	Korean Astronomy and Space Science Institiute
Priyanka Rani	Priyanka@iucaa.in	IUCAA, Pune
Shaun Read	shaun.read@nottingham.ac.uk	University of Nottingham
Henri Reboul	henri.reboul@umontpellier.fr	LUPM (Laboratoire Univers et Particules de Montpellier) UMR 5299
Raymond Remigio	remigior@uci.edu	University of California, Irvine
Mitchell Revalski	mrevalski@stsci.edu	STScI
Omar Ulises Reyes Amador	o.reyes@irya.unam.mx	Universidad Nacional Autónoma de México
Jeff Rich	jrich@carnegiescience.edu	Carnegie Observatories
Chris Richardson	crichardson17@elon.edu	Elon University
Rogemar A. Riffel	rogemar@ufsm.br	UFSM
Fanni Ristioja	fmrist@utu.fi	University of Turku
Bruno Rodríguez Del Pino	brodriguez@cab.inta-csic.es	Centro de Astrobiología (CSIC-INTA)
Paola Rodriguez Hidalgo	paola@uw.edu	University of Washington Bothell
Ciaran Rogers	rogers@mail.strw.leidenuniv.nl	Leiden University
Noah Rogers	roge0291@umn.edu	University of Minnesota
Fernando J Romero-Cruz	fer.j.rom@gmail.com	ITESG
F. Fabián Rosales-Ortega	frosales@inaoep.mx	INAOE
David Rosario	david.rosario@newcastle.ac.uk	Newcastle University
Andrew Rosenswie	arosenswie@gmail.com	University of Potsdam
Barry Rothberg Kate Rowlands	dr.barry.rothberg@gmail.com krowlands@stsci.edu	Large Binocular Telescope Observatory/George Mason University STScI
Niranjan Roy	niranjan.roy@uconn.edu	University of Connecticut
Namrata Roy	naroy@ucsc.edu	University of California Santa Cruz
Mason Ruby	mdruby@memphis.edu	University of Memphis
David Rupke	rupked@rhodes.edu	Rhodes College
Sanchit Sabhlok	ssabhlok@ucsd.edu	UC San Diego
Anna Sajina	Anna.sajina@tufts.edu	Tufts University
Alberto Saldana-Lopez	alberto.saldanalopez@unige.ch	University of Geneva
Sheyda Salehirad	fatemehsalehirad@montana.edu	Montana State University
Dinalva A. Sales	dinalvaires@gmail.com	Federal University of Rio Grande - FURG
Patricia Sanchez-Blazquez	psanchezblazquez@ucm.es	Universidad Complutense De Madrid
Sriram Sankar	sriram@saao.ac.za	South African Astronomical Observatory
Abhirami Sarma	abhiramisarmaa@gmail.com	Student
Jorge Sarrato Alós	jorgesarrato@gmail.com	Institute of Astrophysics of the Canary Islands
Elizaveta Sazonova	esazono1@jhu.edu	Johns Hopkins University
Fabian Scheuermann	f.scheuermann@uni-heidelberg.de	Astronomisches Rechen-Institut, Zentrum für Astronomie der Universität Heidelberg
Matthew Selwood	matthew.selwood@bristol.ac.uk	University of Bristol
Ken Sembach	sembach@stsci.edu	Space Telescope Science Institute
Anil Seth	aseth@astro.utah.edu	University of Utah

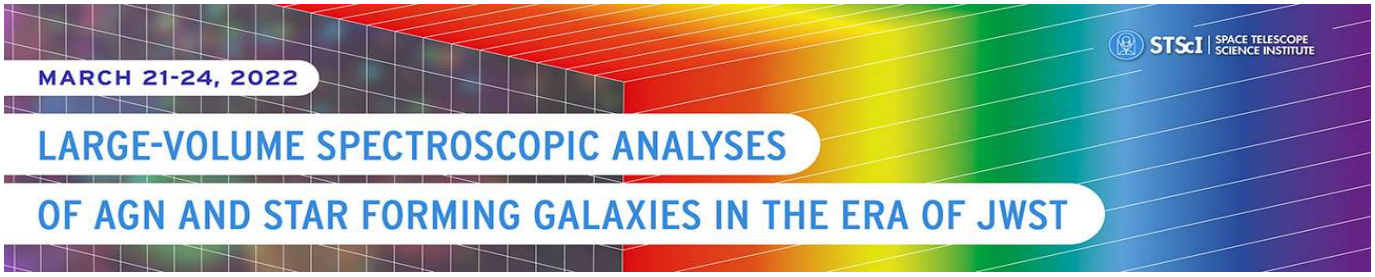
Remington Sexton	remington.o.sexton.ctr@us.navy.mil	USNO/GMU
Raman Sharma	Rs2755@bath.ac.uk	Bath University
Irene Shivaei	ishivaei@arizona.edu	University of Arizona
Mainak Singha	mainak.singha@ucdconnect.ie	University Of Manitoba
Małgorzata Siudek	msiudek@ifae.es	IFAE
Rosalind Skelton	ros@saao.ac.za	South African Astronomical Observatory
Roy Slater	roy.slater@userena.cl	Universidad de La Serena
Aleksandrina Smirnova	ssmirnova@gmail.om	Special Astrophysical Observatory of the Russian Academy of Sciences
Dan Smith	d.j.b.smith@herts.ac.uk	University of Hertfordshire
Linda Smith	lsmith@stsci.edu	STScI
JD Smith	jd.smith@utoledo.edu	University of Toledo
Marzena Sniegowska	msniegowska@camk.edu.pl	Nicolaus Copernicus Astronomical Center Polish Academy of Sciences
Aleksandra Solarz	asolarz@eso.org	ESO
Yiqing Song	ys7jf@virginia.edu	University of Virginia
Monika Soraisam	monika.soraisam@noirlab.edu	NOIRLab/Gemini Observatory
Belen Sotomayor	belen.sotomayor@alumnos.uv.cl	Universidad de Valparaiso
Marko Stalevski	marko.stalevski@gmail.com	Astronomical Observatory of Belgrade
Adam Stanford	stanford@physics.ucdavis.edu	UC-Davis
Tjitske Starkenburg	tjitske.starkenburg@northwestern.edu	CIERA, Northwestern University
Maria Stone	mbstone12@gmail.com	University of Turku
Hyewon Suh	hyewon.suh@noirlab.edu	Gemini Observatory
Elizabeth Tarantino	ejtino@astro.umd.edu	University of Maryland
Pasquale Temi	pasquale.temi@nasa.gov	NASA ARC
Teja Teppala	ttgbk@mail.missouri.edu	University of Missouri
Mercedes Thompson	msthomps@phas.ubc.ca	University of British Columbia
Mallory Thorp	mallorythorp@uvic.ca	University of Victoria
Yoshiki Toba	toba@kusastro.kyoto-u.ac.jp	Kyoto University
Giulia Tozzi	giulia.tozzi@unifi.it	Dipartimento di Fisica e Astronomia, Università di Firenze
Akshat Tripathi	akshatt3@illinois.edu	The University of Illinois at Urbana Champaign
James Trussler	james.trussler@manchester.ac.uk	University of Manchester
Vivian U	vivianu@uci.edu	University Of California, Irvine
Hannah Übler	hu215@cam.ac.uk	Kavli Institute for Cosmology, Cambridge
Hideki Umehata	umehata@icrr.u-tokyo.ac.jp	University of Tokyo
Seenivasan V	seenivasan.physics@gmail.com	The Madura College (Autonomous)
Natalia Vale Asari	natalia@astro.ufsc.br	Universidade Federal de Santa Catarina
Akash Vani	akashdvani@gmail.com	University of Heidelberg
Julio Vannini	jvannini@gmail.com	Asociación Nicaraguense de Astronomos Aficionados, ANASA
Christian Vassallo	Clvass@utu.fi	Univetsity of Turku
Andrey Vayner	avayner1@jhu.edu	Johns Hopkins University
Jose Vazquez-Mata	jvazquez@astro.unam.mx	UNAM
Giacomo Venturi	gventuri@astro.puc.cl	Pontificia Universidad Católica de Chile (PUC), Instituto de Astrofisica
Daniela Vergani	daniela.vergani@inaf.it	INAF OAS
Marianne Vestergaard	mvester@nbi.ku.dk	The Niels Bohr Institute
Marcelo Vicentin	marcelo.vicentin@usp.br	Universidade de São paulo - Departamento de Astronomia (IAG/USP)
Giustina Vietri	giustina.vietri@inaf.it	INAF-OAR
Akke Viitanen	akke.viitanen@helsinki.fi	University of Helsinki

Mikko Vuori	mikko.vuori@helsinki.fi	Helsinki University
David Wake	dwake@unca.edu	University Of North Carolina Asheville
Xin Wang	wangxin@ipac.caltech.edu	California Institute Of Technology
Wuji Wang	wuji.wang_astro@outlook.com	Center for Astronomy of Heidelberg University
Lingzhi Wang	wanglingzhi@bao.ac.cn	CASSACA
John Weaver	john.weaver.astro@gmail.com	Cosmic Dawn Center, Niels Bohr Institute
Roger Wesson	rw@nebulousresearch.org	University College London
Kyle Westfall	westfall@ucolick.org	UC Observatories
James Wiley	jhwiley@ucsd.edu	UCSD
Christopher Willmer	cnaw@as.arizona.edu	Steward Observatory/University of Arizona
Anna Wójtowicz	ania.wojtowicz@doctoral.uj.edu.pl	Astronomical Observatory of the Jagiellonian University
Zhenyu Wu	Zhenyu.Wu@ed.ac.uk	University of Edinburgh
Jianjun Xu	jianjx@amazon.com	Amazon Web Services
Lin Yan	lyan@caltech.edu	California Institute of Techno
Chentao Yang	chentao.yang@chalmers.se	Chalmers University of Technology
Guang Yang	gyang206265@gmail.com	Texas A&M University
Aleksi Yli-Laurila	ajylla@utu.fi	University of Turku
Jason Young	jyoung@mtholyoke.edu	Mount Holyoke / UMass Amherst
Weixiang Yu	wy73@drexel.edu	Drexel University
Sandra Zamora Arenal	sandra.zamora@uam.es	Theoretical Physics Department, Universidad Autónoma de Madrid, Spain
Theodora Zastrocky	tzastroc@uwyo.edu	University of Wyoming
Jorge Zavala	jorge.zavala@nao.ac.jp	NAOJ
Fatemeh Zahra Zeraat Gari	fzeraatgari@xjtu.edu.cn	Xi'an Jiaotong University
Shuo Zhang	szhang@bard.edu	Bard College
Hong-Xin Zhang	hzhang18@ustc.edu.cn	University of Science and Technology of China
Dazhi Zhou	dazzh@space.dtu.dk	Cosmic Dawn Center / DTU
Peixin Zhu	u7160411@anu.edu.au	The Australian National University
Zhuyun Zhuang	zzhuang@astro.caltech.edu	Caltech
Igor Zinchenko	Igor.Zinchenko@lmu.de	LMU, Munich
Abdu Zoghbi	azoghbi@umd.edu	NASA GSFC - HEASARC



Workshop Organizing Committee

Travis Fischer (co-chair), STScI
Bethan James (co-chair), STScI
Valentina Abril Melgarejo, STScI
Dzhuliya Dashtamirova, STScI
Norman Grogin, STScI
Yasaman Homayouni, STScI
Nimisha Kumari, STScI
Steph LaMassa, STScI
David Law, STScI
Marcio Melendez, STScI
Matilde Mingozzi, STScI
Andreea Petric, STScI
Mitchell Revalski, STScI
Gisella de Rosa, STScI
Andrey Vayner, JHU
Xinfeng Xu, JHU



Invited Speakers

pPXF – Michele Cappellari (University of Oxford)
BEAT – Dzhuliya Dashtamirova (STScI)
LZIFU – Anne Medling (University of Toledo)
specutils/Jdaviz – Patrick Ogle & Camilla Pacifici (STScI)
Pipe3D – Sebastian Sanchez (Universidad Nacional Autónoma de México)
BADASS – Remington Sexton (United States Naval Observatory)
PAHFIT – JD Smith (University of Toledo)