



10415 - A Proper Motion Study of the Ionized Gas in the Vicinity of the Galactic Center Black Hole

Cycle: 13, Proposal Category: GO
(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
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VISITS

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(3) GCPAA2A (2) GCPAA1A	NIC1	2	25-Aug-2005 21:14:27.0	yes
02	(3) GCPAA2A (2) GCPAA1A	NIC1	2	25-Aug-2005 21:14:44.0	yes

4 Total Orbits Used

ABSTRACT

The Galactic Center's distance of only 8 kpc provides a unique opportunity to study the interaction of a supermassive black hole with its environment at a level of detail not possible for other galaxies. We propose to observe the inner parsec of the Galaxy in the Paschen alpha line with Camera 1 of NICMOS in order to study the kinematics of ionized gas in the vicinity of the supermassive black hole coincident with Sgr A*. Our previous GO

Proposal 10415 - Overview

program 7842 yielded detailed Pa alpha images revealing complex, filamentary structure at 0.16 arcsec (0.006 pc) resolution. However, proper motions could not be robustly derived from that data set due to the fact that the two epochs were spaced only 7 months apart. In order to follow up on preliminary results showing evidence for high proper motions within 2" of Sgr A* and to characterize the rest of the central parsec, we propose to obtain two additional epochs within Cycle 13 so that the dataset will comprise independent measurements of the proper motions ranging from intervals of 5 months to 7 years, with the 7 year interval giving a 1 sigma accuracy of 45 km/s. These will be combined with existing radial velocity measurements to provide the first complete characterization of the kinematics of the ionized gas in the central parsec. This is crucial to interpreting the relative importance of gravitational forces, stellar winds, and possible accretion onto or outflow from the black hole. These observations may possibly lead to the first direct observation of gas in the process of accretion (or ejection via a jet) associated with the Galactic Center black hole. The kinematics of the gas may also imply that accretion may be inhibited, and this could explain the low luminosity of Sgr A*.

OBSERVING DESCRIPTION

This proposal requires 2 epochs of observation in order to obtain proper motions. Each epoch (visit) is comprised of 2 orbits, with data taken in F187N and F190N. The orientations of visit 2 is matched exactly to the observed orientation of visit 1.

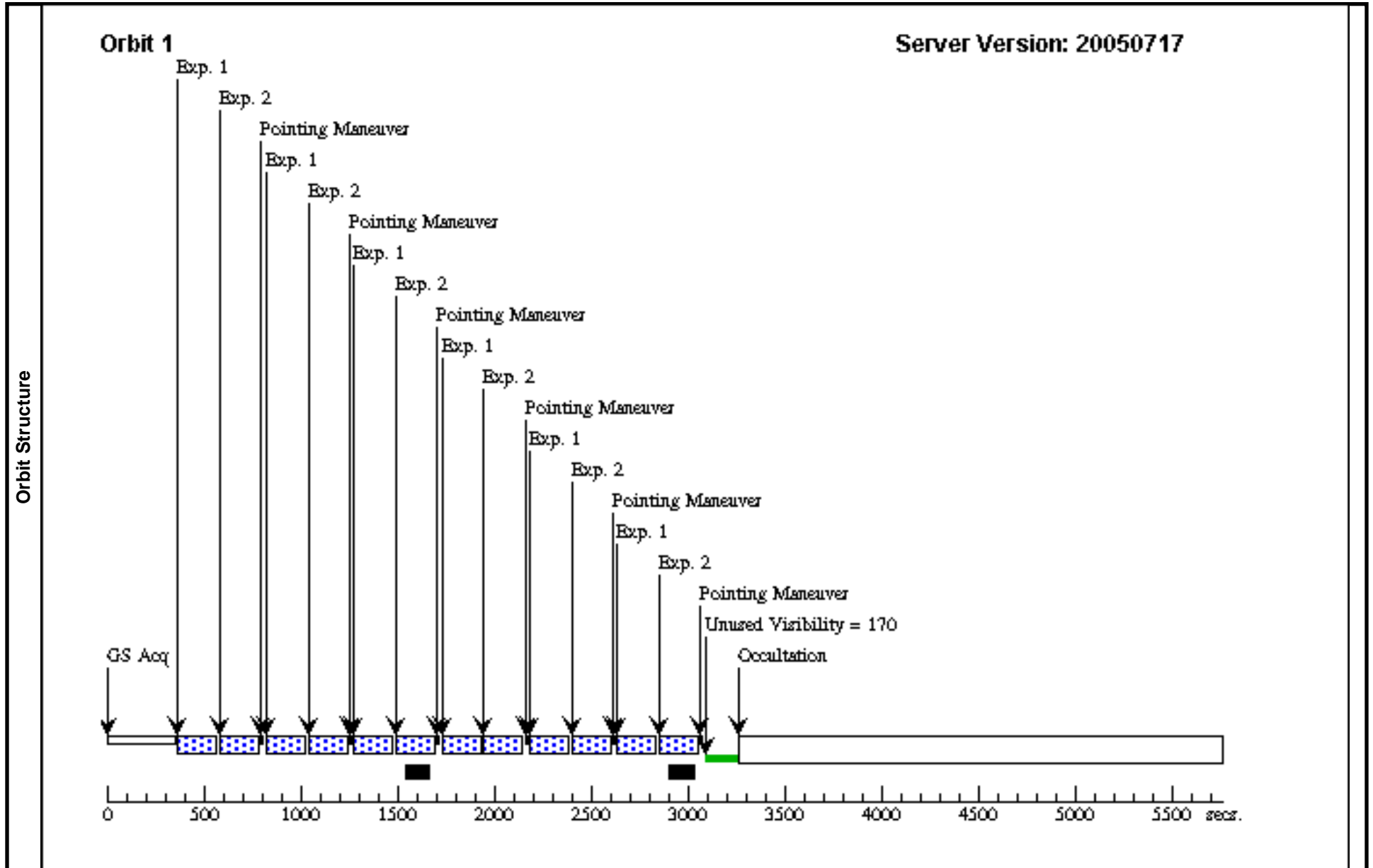
Proposal 10415 - Visit 01 - A Proper Motion Study of the Ionized Gas in the Vicinity of the Galactic Center Black Hole

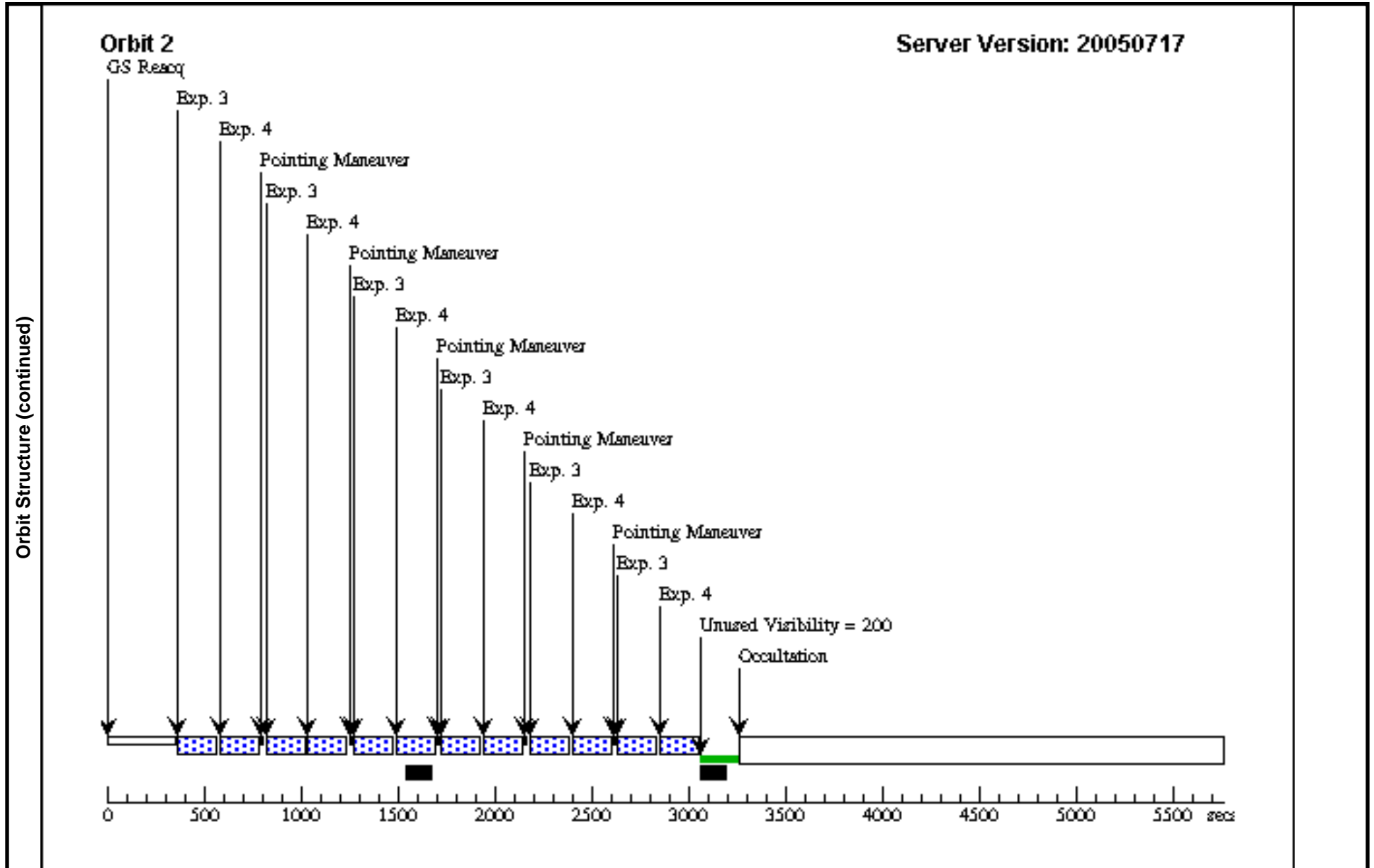
Fri Aug 26 01:14:47 GMT 2005

Visit	Proposal 10415, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: NIC1 Special Requirements: ORIENT 270.0D TO 270.0 D; BEFORE 21-MAR-2005:00:00:00									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=NIC-SPIRAL-DITH Purpose=DITHER Number Of Points=6 Point Spacing=2.8 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=225 Angle Between Sides= Center Pattern=false					(1-2), (3-4)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SGRASTAR Alt Name1: SGRA	RA: 17 45 40.0383 (266.4168262d) Dec: -29 00 28.07 (-29.00780d) Equinox: J2000 Plate Id: 067N		V=35.0	Coordinate Source: HST_IMAGE				
	(2)	GCPAA1A	Offset from SGRASTAR by RA Offset: -0.1143 Dec Offset: 2.0		V=35.0	Offset Position (GCPAA1A) Coordinate Source: HST_IMAGE				
	(3)	GCPAA2A	Offset from SGRASTAR by RA Offset: -0.3049 Dec Offset: -1.0		V=35.0	Offset Position (GCPAA2A) Coordinate Source: HST_IMAGE				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(2) GCPAA1A	NIC1, MULTIACCUM, NIC1	F187N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM		Pattern 1-2 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]	[1]
	2		(2) GCPAA1A	NIC1, MULTIACCUM, NIC1	F190N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM		Pattern 1-2 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]	[1]

Proposal 10415 - Visit 01 - A Proper Motion Study of the Ionized Gas in the Vicinity of the Galactic Center Black Hole

Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	3	(3) GCPAA2A	NIC1, MULTIACCUM, NIC1	F187N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM	Pattern 3-4 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]		[2]	
4	(3) GCPAA2A	NIC1, MULTIACCUM, NIC1	F190N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM	Pattern 3-4 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]		[2]		





Proposal 10415 - Visit 02 - A Proper Motion Study of the Ionized Gas in the Vicinity of the Galactic Center Black Hole

Fri Aug 26 01:14:48 GMT 2005

Visit	Proposal 10415, Visit 02 Diagnostic Status: No Diagnostics Scientific Instruments: NIC1 Special Requirements: ORIENT 270.32D TO 270.32 D; BEFORE 21-MAR-2006:00:00:00									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(1)	Pattern Type=NIC-SPIRAL-DITH Purpose=DITHER Number Of Points=6 Point Spacing=2.8 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=225 Angle Between Sides= Center Pattern=false					(1-2), (3-4)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	SGRASTAR Alt Name1: SGRA	RA: 17 45 40.0383 (266.4168262d) Dec: -29 00 28.07 (-29.00780d) Equinox: J2000 Plate Id: 067N		V=35.0	Coordinate Source: HST_IMAGE				
	(2)	GCPAA1A	Offset from SGRASTAR by RA Offset: -0.1143 Dec Offset: 2.0		V=35.0	Offset Position (GCPAA1A) Coordinate Source: HST_IMAGE				
	(3)	GCPAA2A	Offset from SGRASTAR by RA Offset: -0.3049 Dec Offset: -1.0		V=35.0	Offset Position (GCPAA2A) Coordinate Source: HST_IMAGE				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(2) GCPAA1A	NIC1, MULTIACCUM, NIC1	F187N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM			Pattern 1-2 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]	[1]
	2	(2) GCPAA1A	NIC1, MULTIACCUM, NIC1	F190N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM			Pattern 1-2 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]	[1]

Proposal 10415 - Visit 02 - A Proper Motion Study of the Ionized Gas in the Vicinity of the Galactic Center Black Hole

Exposures (continued)	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	3	(3) GCPAA2A	NIC1, MULTIACCUM, NIC1	F187N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM	Pattern 3-4 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]		[2]	
4	(3) GCPAA2A	NIC1, MULTIACCUM, NIC1	F190N	SAMP-SEQ=STEP3 2; NSAMP=13; OFFSET=SAM	Pattern 3-4 (1)	[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)] [==>(Pattern 6)]		[2]		

