Proposal for *Chandra* Observations **Cycle 11**

Cover Page

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Proposal Title A systematic measurement of the mass-loss of ζ Ori			
Subject Category STARS AND WD			
Proposal Type LP	**Linked Proposal** N	**Distr. Medium** WWW ONLY	**Proprietary Rights** S
Total Requested Time 300.00	**Number of Targets** 1		**Proposed Budget**

Joint Proposal?			
HST Orbits	**HST Instruments:**		
XMM Time	**Spitzer Time**	**Suzaku Time**	
NOAO Nights?	**NOAO Telescope/Instruments:**		
NRAO Hours	**NRAO Telescopes**		

Abstract

We propose a 300 ks HETGS observation of the O supergiant ζ Orionis. In combination with 74 ks archival data, we will make very high signal-to-noise measurements of emission line profile shapes, which sensitively measure the wind optical depth as a function of wavelength. We will use the wavelength dependence of wind optical depth from all usable lines to make a precise measurement of the mass-loss rate, and we will definitively test whether the wind is porous. We will also use XCMFGEN, our powerful new radiative transfer code, to construct global models which will be fit to X-ray, UV, and optical data.

Proposal Number 11200505 Date: 2009-03-17 Admin. use only

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General Form

PI	Dr. Maurice Andrew Leutenegger
Proposal Title	A systematic measurement of the mass-loss of ζ Ori

Co-Investigator(s)

First Name Last Name	E-Mail Institute	Country
David Cohen	cohen@astro.swarthmore.edu Swarthmore College	USA
Marc Gagne	mgagne@wcupa.edu West Chester University	USA
John Hillier	jdh@rosella.phyast.pitt.edu University of Pittsburgh	USA
Richard Kelley	Richard.L.Kelley@nasa.gov NASA/GSFC	USA
Stanley Owocki	owocki@bartol.udel.edu University of Delaware	USA
Janos Zsargo	jzsargo@bruno.phyast.pitt.edu University of Pittsburgh	USA

Are there additional Co-Is listed in the science justification? N

Is the first Co-I doing observing, rather than the PI? N **Telephone:**

Institute Endorsement

Name of Administrator	Nicholas E. White
Administrative Authority	Director of Science and Exploration
Administrative Institute	NASA/GSFC
Admin Signature:	**Date:**
PI Signature:	**Date:**

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Target Summary

PI Dr. Maurice Andrew Leutenegger

Proposal Title
A systematic measurement of the mass-loss of ζ Ori

Tar No	Target Name / Solar System Object / Grid Name / Target Description (keywords)	(J2000) R.A. Dec.	Offsets Y Detector Z Detector SIM Trans	Optical Monitor V-Mag	Observ. Time (ksec)	Detector Grating HRC Timing	(c/s) Count Rate 1st Order Total Fld.	Time-Constr? Ext.Src?	Grid #Points MaxDist.
1	Zeta Orionis NONE MASSIVE STARS	05 40 45.5 -01 56 33.3		N	300.000	ACIS-S HETG N	0.200000 0.180000 80.000000	P N	N

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ACIS Parameters (Required, Pileup, Telemetry Parameters)

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Tar No.	Exposure Mode / Telemetry. Format	CCDs On I0 S0	I1 S1	I2 S2	I3 S3	S4	S5	Most Eff. CCD Time	Subarray Type	StartRow No.Rows	Alternating Exposures Y/N	Nbr. Rows Exp.Time	Energy Filter Y/N	Lower Thresh. Range	Spectra Max Count	Mult. Lines
1	TE		N	N	N	N		Y	NONE		N		Y	0.1000		
	VF	Y	Y	Y	Y	Y	Y							12.900		

ACIS Parameters (Custom:Telemetry Overflow Parameters)

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	Spatial Windows										
Tar No	Order	Chip	Type	Start Row	Start Col	Width	Height	Lower Threshold	Enery Range	Sample Rate	Additional Spatial Windows

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Target Constraints

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	Window Constraint			**Roll Constraints**				**Phase Dependent Observations**			
Tar No	Flag	Start Time	Stop Time	Flag	180?	Angle (degrees)	Tolerance (degrees)	Flag	Epoch(MJD) Period(days)	Min.Phase Min.Error	Max.Phase Max.Error
1	N			P	Y	10.00000	50.00000	N			
	N			N	N						
	N			N	N						
	N			N	N						

	Group Observations			**Un-interrupt?**	**Coordinated**		**Add. Constraints**
Tar No	Flag	Group ID	Interval(days)		Flag	Interval(days)	
1	N			N	N		N

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Monitor Observations

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Tar No	**Order**	Exp. Time (ksec)	Minimum Interval (days)	Maximum Interval (days)
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

Tar No	**Order**	**Exp. Time (ksec)**	Minimum Interval (days)	Maximum Interval (days)
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

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TOO Details

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Tar No	Trig-ger?	Alternates Group Name	Alternates Nbr. Req.	Response Window Type (days)	Response Window Start	Response Window Stop	Prob-ability	Initial Alloc.	**Followup Observations** Order	Exp. Time	Minimum Interval (days)	Maximum Interval (days)	Obs.Params specified by Target No.
									1				
									2				
									3				
									4				
									5				
									6				
									7				
									8				

TOO Trigger Criteria

TOO Followup Instructions

If this TOO is a resubmission of a proposal approved in the previous Cycle, should this TOO be canceled if the previous Cycle TOO is triggered?

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Target Remarks

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Tar No	Remarks Coordinated Observation: Observatories