



## 12294 - Boron in F stars in the Hyades - Insights into the Li-Be Dip

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

### INVESTIGATORS

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### VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) HIP-20357	STIS/CCD STIS/NUV-MAMA	2	01-Jul-2010 23:19:09.0	yes
02	(2) HIP-19504	STIS/CCD STIS/NUV-MAMA	2	01-Jul-2010 23:19:16.0	yes

4 Total Orbits Used

### ABSTRACT

Dramatic deficiencies of Li in the mid-F stars of the Hyades cluster were discovered by Boesgaard and Tripicco in 1986. Using high-resolution, high signal-to-noise spectra from the Keck 10-m telescope, Boesgaard and King discovered the corresponding deficiencies in Be in the same narrow temperature region in the Hyades. We propose an investigation into the B abundance in the Hyades F stars to ascertain if there is also a B dip. Boron can only be observed with HST; we plan to use the resonance line of B I at 2497 Å. Each of these three elements is destroyed inside stars, but at different depths.

The threshold temperatures are  $2.5 \times 10^6$ ,  $3.5 \times 10^6$ , and  $5 \times 10^6$  K for Li, Be, B respectively. Consequently these elements survive to

increasingly greater depths in a star and their surface abundances act as a report on the depth and thoroughness of mixing in the star. Although the mixing is slow, it is not straight convective mixing. These observations will help determine the nature of the mixing mechanism(s) and the connection to stellar rotation. The abundance of \*all three\* light elements in a cluster of known age and metallicity can provide the information needed to discern internal stellar processes. The Li and Be deficiencies occur in field and cluster stars in this mass range (1.1 - 1.25 solar masses), but the mechanisms can best be studied in a cluster of stars of common origin and known characteristics. The Hyades cluster at  $7 \times 10^8$  yr is close enough to contain stars bright enough for this investigation.

### **OBSERVING DESCRIPTION**

In this project we plan to observe selected F dwarfs in the Hyades to search for evidence of a B dip like the previously discovered Li dip and the more recently discovered Be dip. We have observed one star on the hot side of the Li-Be dip and there is one in the HST archive on the cool side of the dip; we will now observe two stars with temperatures in the dip.

We plan to do two orbits each on the two stars in the dip, vB37 and vB13, to obtain S/N of 100 for them. Our prior experience with B abundance work indicates that S/N of a minimum of 50 is desirable; we prefer to go to 100 for the all-important Li-Be dip stars to find the B abundance in them with greater precision, especially if B should turn out to be depleted.

vB 37 = HD 27561 = HIP 20357 F5 V A(Li) = 2.29 A(Be) = 0.62

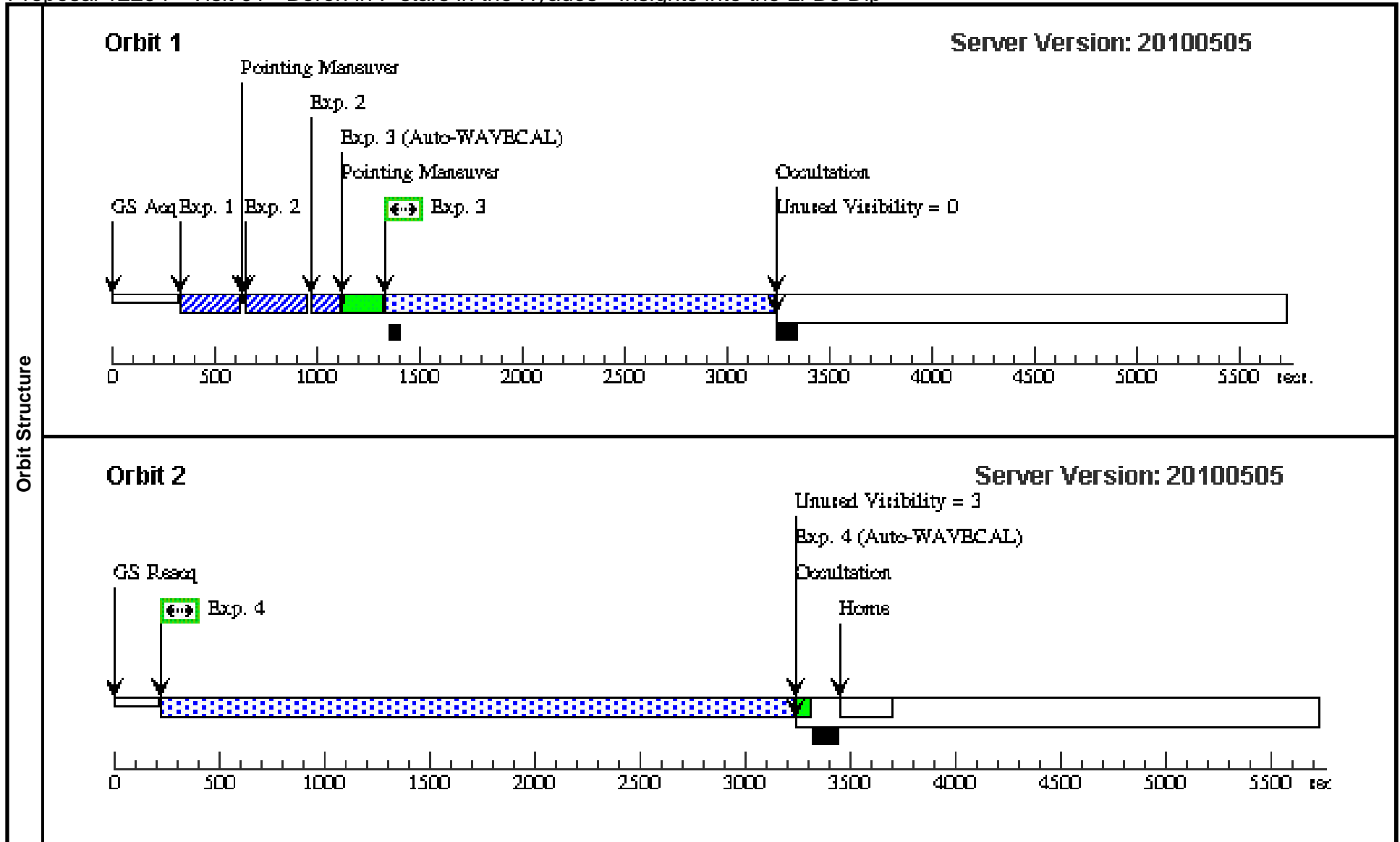
vB 13 = HD 26345 = HIP 19504 F6 V A(Li) = <1.78 A(Be) = 0.66

The light element abundances in these four stars will tell us whether there is a B dip by comparing B in stars on either side of the Li-Be dip with those in the dip. The stars outside the dip should reveal the initial B abundance in this young cluster.

For the first orbit approximately 24 minutes are taken by overhead for guide star acquisition, target acquisition, peak-up, MAMA overhead. There will be approximately 1830 seconds of exposure on the targets. These stars are in an open star cluster, but none has a nearby companion to complicate the acquisition of the target. The ordinary calibration procedures will be sufficient for this project.

Proposal 12294 (STScI Edit Number: 0, Created: Thursday, July 1, 2010 10:19:20 PM EST) - Overview

Visit	<b>Proposal 12294, Visit 01</b> <span style="float: right;">Fri Jul 02 03:19:21 GMT 2010</span> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: STIS/CCD, STIS/NUV-MAMA Special Requirements: (none)									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
	(1)	HIP-20357	RA: 04 21 34.7955 (65.3949812d) Dec: +14 24 35.24 (14.40979d) Equinox: J2000 <i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>		V=6.578+/-0.0043	Reference Frame: ICRS				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) HIP-20357	STIS/CCD, ACQ, F25ND3	MIRROR				0.1 Secs [==>]	[1]
	2		(1) HIP-20357	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				0.1 Secs [==>]	[1]
	3		(1) HIP-20357	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				1880.0 Secs [==>]	[1]
	4		(1) HIP-20357	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2990.0 Secs [==>]	[2]



Proposal 12294 - Visit 01 - Boron in F stars in the Hyades - Insights into the Li-Be Dip

Fri Jul 02 03:19:22 GMT 2010

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(2)	HIP-19504	RA: 04 10 42.3643 (62.6765179d) Dec: +18 25 23.71 (18.42325d) Equinox: J2000			V=6.576+/-0.0043
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>						

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(2) HIP-19504	STIS/CCD, ACQ, F25ND3	MIRROR				0.1 Secs [==>]	[1]
	2		(2) HIP-19504	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				0.1 Secs [==>]	[1]
	3		(2) HIP-19504	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				1880.0 Secs [==>]	[1]
	4		(2) HIP-19504	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2996.0 Secs [==>]	[2]

