

# Binaries

## Thematic team

Ignasi Ribas

Institut d'Estudis Espacials de Catalunya/CSIC

Carla Maceroni

INAF-Osservatorio Astronomico di Roma

COROTWeek 8, Toulouse, May 2005

**IIEC**



**OAR**

# Outline

- Team information
- Binaries in the COROT “eyes”
- Plans for the upcoming AO call

# Team information

<http://thor.ieec.uab.es/binteam>

The screenshot shows a Mozilla Firefox browser window displaying the 'Binaries Thematic team' page. The title bar reads 'COROT binaries thematic team - Mozilla Firefox'. The main content area features a 'Binaries Thematic team' logo with two spheres and the text 'Binaries Thematic team'. A sidebar on the left lists navigation links: Home, Members, Information, Links, and News. The main text discusses binary star surveys and COROT's impact. Two contact sections at the bottom list Ignasi Ribas and Carla Maceroni with their respective institutions and addresses.

**Home**  
**Members**  
**Information**  
**Links**  
**News**

Surveys in the Galaxy indicate that over 60% of the stars belong to binary or multiple systems. Binary stars have proved excellent laboratories for the study of a variety of aspects within stellar astrophysics. Among other reasons, this is because they yield direct determinations of the most fundamental stellar properties (masses and radii) and because they are subject to very interesting evolutionary processes. Still today binaries play a central role in some of the most important open problems in stellar astrophysics.

COROT is expected to have a strong impact on binary star research. The unprecedented accuracy of the photometry and its nearly-continuous sampling for extended periods of time will permit detailed analysis of binary stars like never before. The superior quality of the observations will open numerous possibilities among which, to name a few, are: fine effects on light curves (reflection, limb darkening, induced pulsations), super-accurate stellar properties, systems with variable light curves (activity phenomena, pulsating stars, interacting systems). In addition, the massive transit survey in the exo-field should uncover a large number of eclipsing binaries, some of which may potentially be very interesting (e.g., low-mass systems).

The purpose of the Binaries Working Group is to coordinate the tasks related to binary star studies within the COROT community and to act as a forum to avoid duplication of efforts and to foster collaborations. The coordination of this working group is shared by

**Ignasi Ribas**  
Institut d'Estudis Espacials de Catalunya/CSIC  
Facultat de Ciències, Campus UAB  
Torre C5-parell-2<sup>a</sup> planta  
E-08193 Bellaterra

**Carla Maceroni**  
INAF - Osservatorio Astronomico di Roma  
via Frascati 33  
Monteporzio C. (RM)  
I-00040 Italia

Page last updated: May 2005  
Design: C. Maceroni & I. Ribas

- **44 members** (as of 20/05/2005)
  - Austria: 1
  - Belgium: 4
  - Brazil: 11
  - France: 1
  - Germany: 2
  - Italy: 21
  - Spain: 4
- **25% women**

## Objectives:

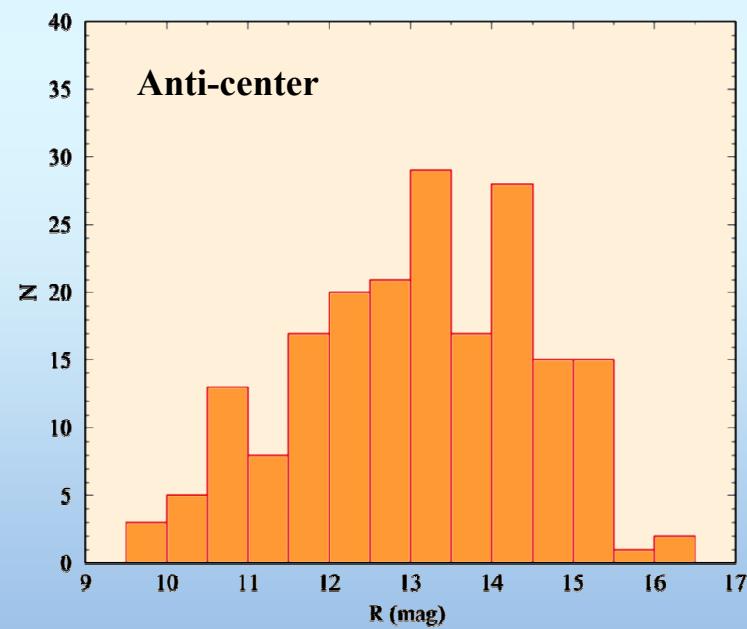
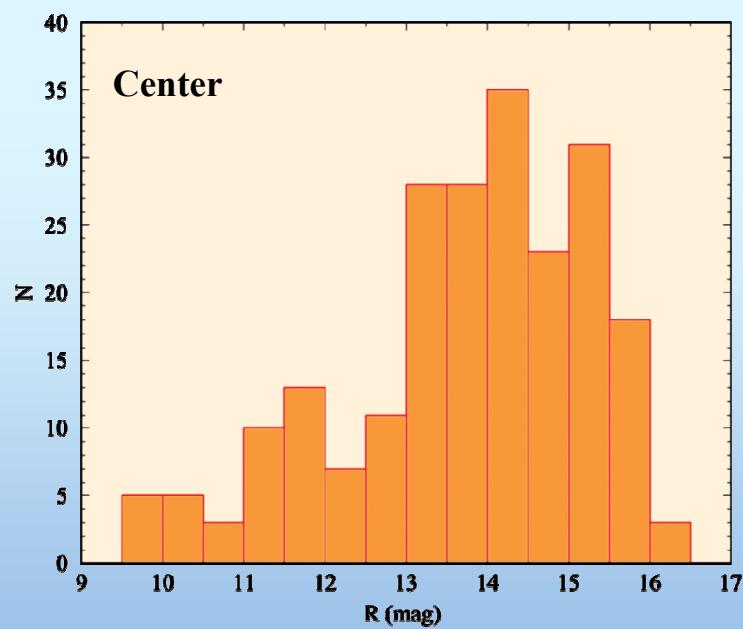
- Coordinate binary star activities within COROT
- Act as a forum to avoid duplications
- Foster collaborations

# Binary stars in the COROT “eyes”

- Three catalogs:
  - GCVS
  - The 9th Catalog of Spectroscopic Binaries
  - The 6th Catalog of Orbits of Visual Binary Stars
- Search radius of 15° (to accommodate a possible drift)
- 9.5 mag < m < 17 mag

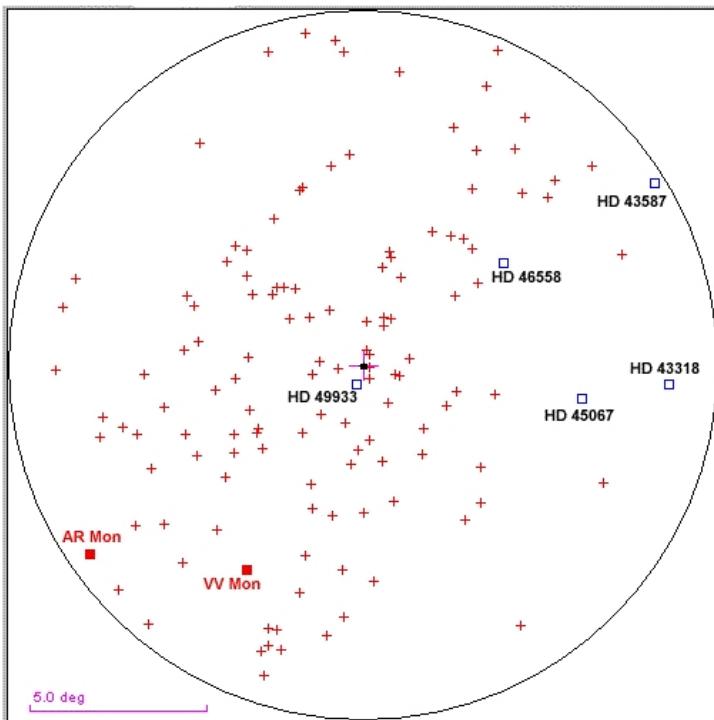
	Center	Anti-center
Eclipsing binaries	220	194
Spectroscopic binaries	17	12
Visual binaries (w/orbits)	3	4

- EB statistics:
  - E & E:  $\Rightarrow \sim 12\%$
  - EA & EA:  $\Rightarrow \sim 60\%$
  - EB & EB:  $\Rightarrow \sim 10\%$
  - EW & EW:  $\Rightarrow \sim 13\%$
  - Others  $\Rightarrow \sim 5\%$
- SB statistics:
  - SB1  $\Rightarrow \sim 65\%$
  - SB2  $\Rightarrow \sim 35\%$

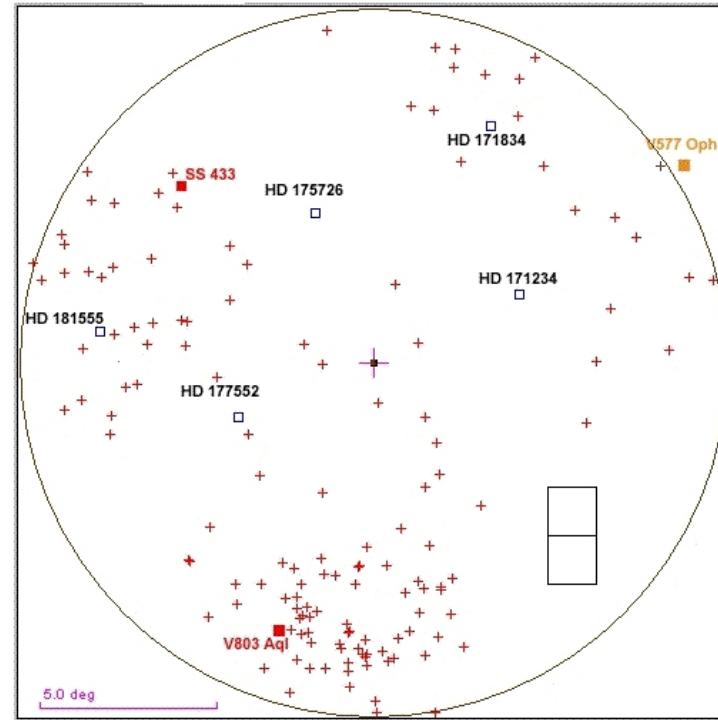


# Known binaries and primary targets

Known eclipsing binaries in COROT FoV, Anticenter



Known eclipsing binaries in COROT FoV, Center

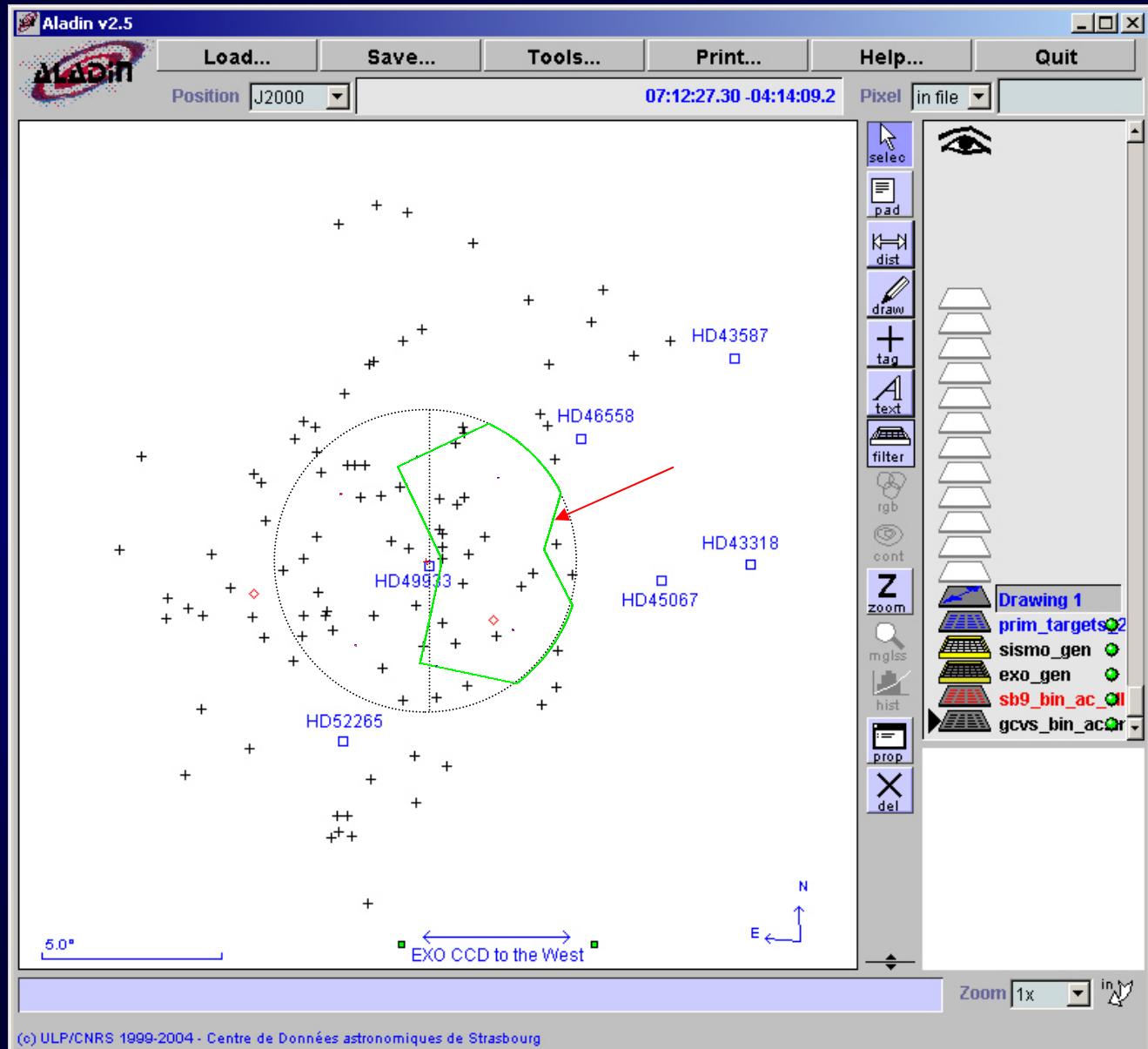


# GCVS4 and SB9, Anticenter, E

Field: AC

E-filter

Targets for  
GB obs  
(spectr.) to  
the West of  
HD 49933 &  
HD 52265

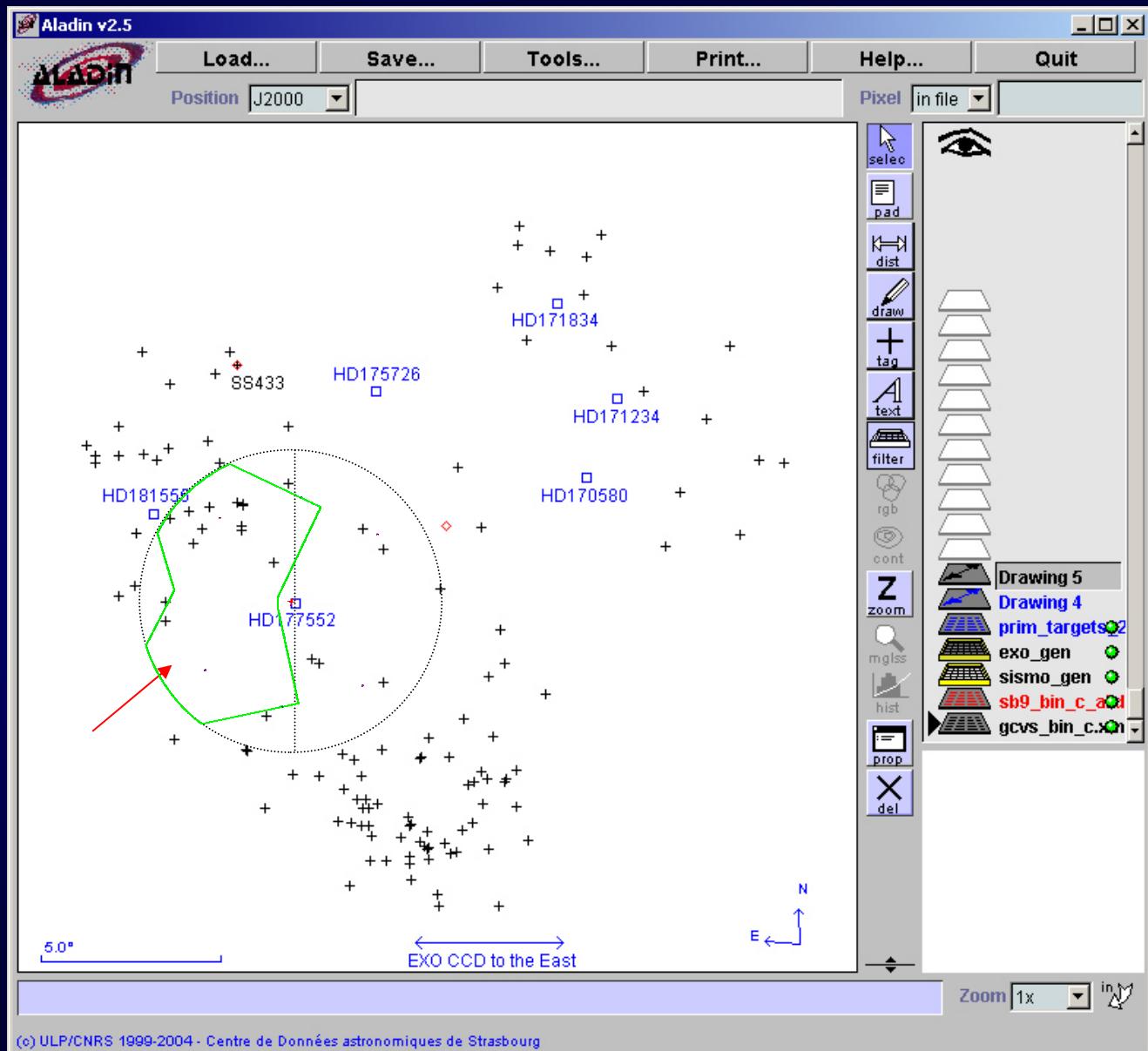


# GCVS4 and SB9, Center, E

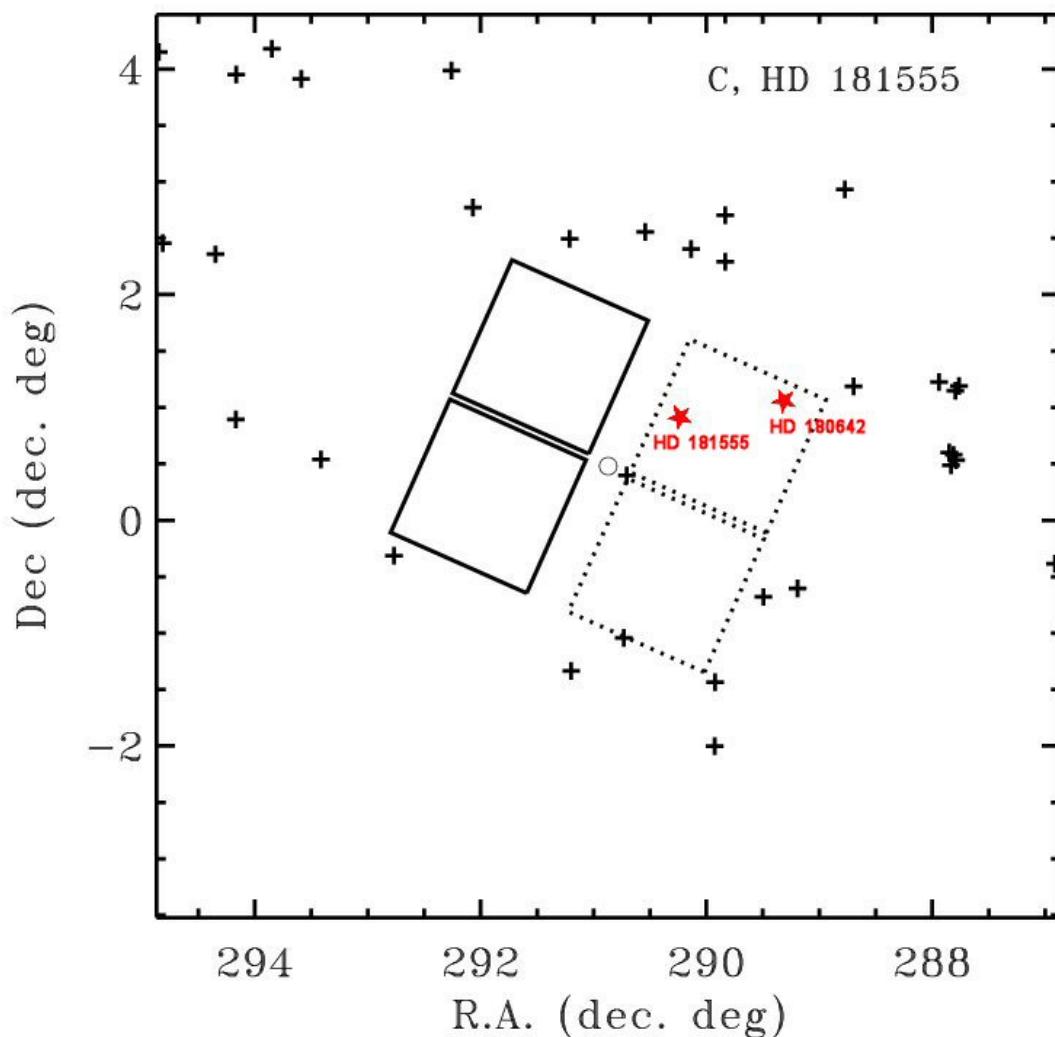
Field: C

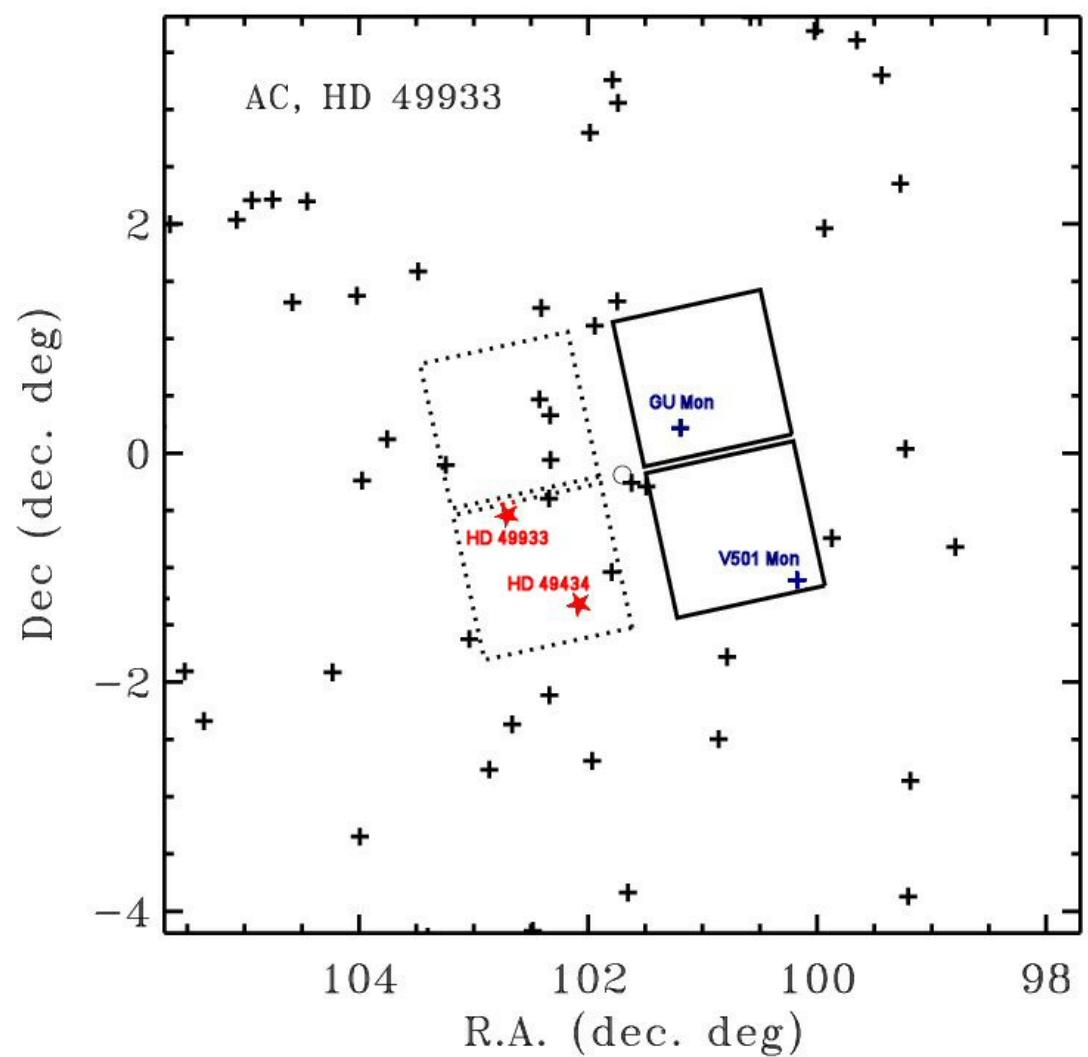
E-filter

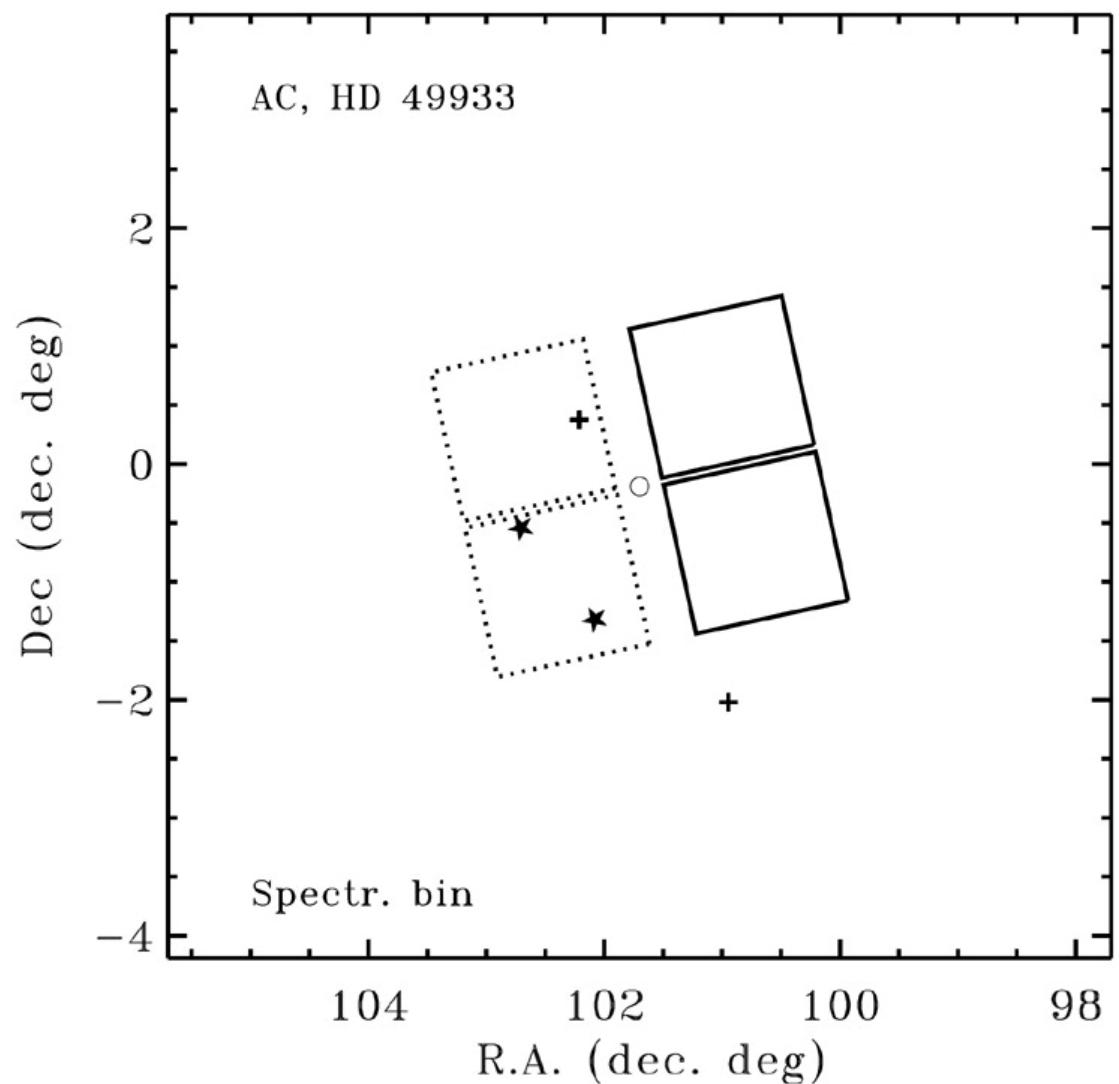
Targets for  
GB obs  
(spectr.) to  
the East



# Preparing the upcoming AO call







# Known EBs in the AC field... V501 Mon

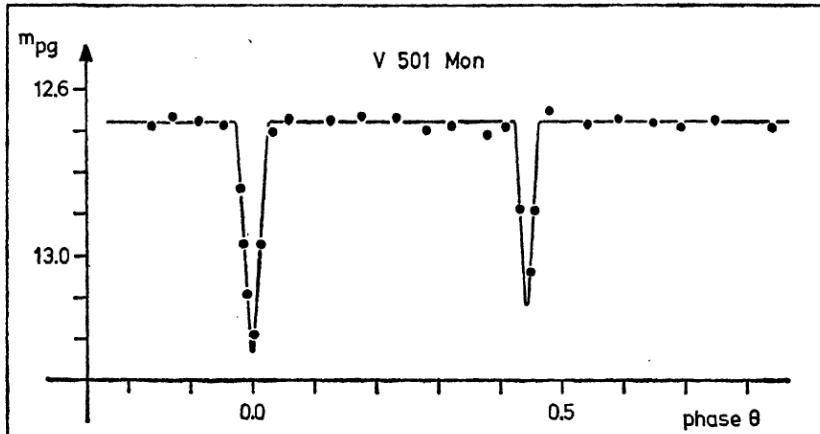


Fig. 1. Photographic light curve of V 501 Mon.

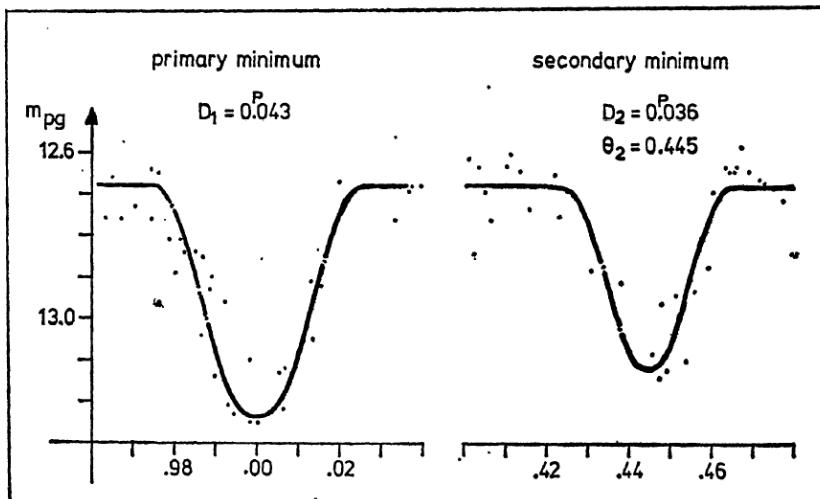


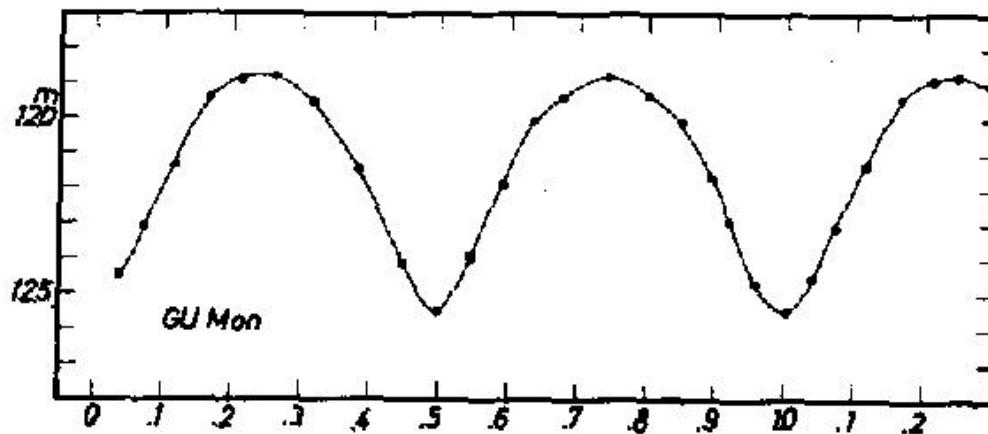
Fig. 2. Minima of V 501 Mon.

- Bossen & Klawitter (1972, AcA, 22, 411)
- Eccentric detached EB
- Possibly mid-F type
- $P = 7.02$  days
- $m = 12.7\text{-}13.2$  mag
- $e \approx 0.1$



Very little photometry  
Probably apsidal motion  
No spectroscopy

# Known EBs in the AC field... GU Mon



Maximum Helligkeit  $11^m_{\cdot}88$  pg

Minimum I Helligkeit 12. 55      Amplitude I  $0^m_{\cdot}67$

Minimum II Helligkeit 12. 55      Amplitude II 0. 67

- W UMa-type EB
- $m = 11.9\text{-}12.6$  mag



Almost no photometry  
No spectroscopy

# Binary letters of interest

Title	P.I.
<i>Fundamental stellar parameters and atmosphere properties by photometric monitoring of known close binaries</i>	C. Maceroni
<i>The formation and early stages of contact binaries: the twin system V803 Aql</i>	C. Maceroni
<i>Monitoring the optical counterpart of the micro-quasar SS 433 (V1383 Aql)</i>	C. Maceroni
<i>A search for key eclipsing binaries with COROT</i>	I. Ribas
<i>A largely unknown delta Scuti star in an eccentric eclipsing binary: V577 Oph</i>	P. Lampens
<i>Two magnetically active close eclipsing binaries not too far from the HD 49933 &amp; HD 49434 field</i>	A. Lanza
<i>Interacting binaries</i>	E. Janot-Pacheco
<i>Pulsation in early type binaries</i>	H. Lehmann
<i>Self lensing in binary systems</i>	J. Schneider

## **So... what do we do?**

- **Join efforts & team up**
- **Ground-based observations**
- **Short runs**