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1998 La Palma International Time Programme: Formation and properties of planetary systems

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Abstract. The 1998 International Time of the Canary Islands Observatories was devoted to the project “Planetary Systems: their formation and properties”, carried out by an European/American team - EXPORT (EXoPlanet Observational Research Team). A total of ≈ 75 observing nights distributed among four observing runs and five different telescopes were used to study the following topics: formation and evolution of planetary systems, spectral signatures of extra-solar planet atmospheres and new planet searches. We were able to collect an enormous data set, including high and intermediate resolution optical spectroscopy, optical photopolarimetry, near-IR photometry, and optical CCD images. This contribution present a short description of the EXPORT project and observing runs. Some general or especific results are presented elsewhere in this volume.

1. Introduction

Studies of exoplanetary systems have received considerable impuls since the discovery of a Jupiter-like planet orbiting 51 Peg (Mayor and Queloz, 1995). Up to now, more than 30 Jupiter-like planets have been reported. The discoveries have been made using the radial velocity method which introduces a $\sin i$ uncertainty in the derived mass. The recently observed photometric transit in the star HD 209458 yields no doubt that the object orbiting the star has a planet mass (e.g. Mazeh et al., 2000, this volume).

These planet discoveries have profound scientific significance and have open new research fields concerning the nature, formation and evolution of planets and planetary systems. For example, the existence of Jupiter-mass planets orbiting very close to their parent stars indicates that the solar system constitutes only one particular scenario of planetary systems; therefore, theoretical and observational studies dealing with alternative scenarios are estimulated. An intriguing point is related to the nature of those massives planets, i.e. they are gaseous objects more or less similar to the giant planets in the solar system or they are large rocky planets. In addition, the success of the radial velocity method provides new impuls to alternative methods in the detection of planets, as e.g. astrometry, transit photometry or microlensing.

2. The EXPORT project

5% of the observing time in the Canary Islands observatories are dedicated to international projects, which can benefit of the deployment of a (simultaneous) group of telescopes and are of a type which unlikely would obtain time through the usual time allocation committees. A group of more than 20 astronomers from different countries (EXPORT: EXoPlanet Observational Research Team) submitted a proposal to the 1998 La Palma International Time in which the following main objectives were addressed:

Table 1. Log of EXPORT observations

Telescope	Instrument/Observing mode	May	July	October	Jan. 99
WHT (La Palma)	UES R \sim 50000 $\sim \lambda\lambda$ 3700-6100Å	14-17	28-31	23-26	28-31
INT (La Palma)	IDS R \sim 10000 $\sim \lambda\lambda$ 5800-6700Å	14-17	28-31	24-28	29-31
NOT (La Palma)	TurPOL Opt. photopolarimetry UBVRI	14-17	28-31	23-27	29-31
CST (Izaña)	IR Phot. + CAIN IR photometry JHK	15-17	28-31	23-26	28-31
JKT (La Palma)	CCD Camera Photometry R		25-31	24-1(Nov.)	

- Formation and evolution of planetary systems, by carrying out observational studies of protoplanetary disks around PMS stars and MS Vega-type objects.
- Search for spectral signatures of extra-solar planet atmospheres, concretely in the spectra of τ Boo and 51 Peg
- New planet searches by means of microlensing techniques and photometric transits in clusters.

Table 1 is a log of EXPORT observations. Telescopes, common-user equipment and observing modes as well as observing dates are detailed. In addition, the IAC80 telescope located on Izaña observatory was used during several nights in summer 1998 to obtain CCD direct images of microlensing alerts. Sky conditions were in general very good and spectroscopic data were obtained during each single scheduled night; good photometric nights were more than 50% of the total.

3. EXPORT Results

We were able to collect an enormous data set, including high and intermediate resolution optical spectroscopy, optical photopolarimetry, near-IR photometry, and optical CCD images. Thus, the main scientific objectives were fulfilled.

The telescopes WHT, INT, NOT and CST were used during the four observing runs to study protoplanetary systems, including Vega-type and PMS stars. \approx 80 stars were observed simultaneously with all telescopes and their corresponding observing modes. Simultaneity is a need when studying PMS stars

and their associated protoplanetary disks for it is well known that these objects are variable. Also, the spectroscopic events observed towards several Vega-type stars, which have been interpreted in terms of infalling solid bodies (e. g. in βPic), are transient. Simultaneity allowed us to monitor the stars in time scales of hours, days and months. The analysis of these data are still in progress though some preliminary results are presented in different contributions in this volume.

The WHT was used during two consecutive nights in May and October to observe the predicted photometric transits of the planets around τBoo and 51 Peg respectively. The idea was to search for spectroscopic signatures due to the orbiting planet. The contribution of Harris et al. in this volume provides the details and results. In addition, some control spectra and photometry of both stars were taken with the INT and NOT.

The two JKT observing runs were used to obtain R band CCD images of stellar clusters to search for photometric transits. Several hundreds of images were taken. The status of this work is described in the contribution by Quirrenbach et al. in this volume.

Finally, the IAC80 telescope was used to follow microlensing events during summer 1998. The results of these observations are also presented in this volume by Tsapras et al.

4. CONCLUSION

The observational objectives of the EXPORT project carried out within the frame of the 1998 Canary Islands International Time were fully achieved. In some respects, the observations are unique since they provide simultaneous spectroscopic and photopolarimetric data of a very large sample of PMS and Vega-type stars. Preliminary results are presented in several contributions in this volume. Detailed analysis are in progress and will be published elsewhere. The EXPORT collaboration is considering different alternatives to make these data available to the community since we consider their scientific content is of interest to other researches.

References

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