Registration form

- Registration type:

Research Applications (ResA)

- Name and Surname:

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- Institute/organization:

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- Abstract:

The instruments, equipment and techniques for observation of double and multiple stars will give the possibility to collect our own data necessary for the investigation of physical and dynamical characteristics of these bodies. Not only that this represents a significant contribution to the international databases, but also has a particular significance for the AOB in the sense of continuing, at a much higher level than hitherto, the 60 years long tradition which puts us among the most prolific in the world in terms of the number of computed orbits.
In continuation of a CCD observational program, measurements will be made of the relative positions of components of visual double and multiple stars. Observations will be carried out by means of the available instruments of the Astronomical Station Vidojevica (ASV). The main goal of the collaboration are observations of visual double and multiple stars aimed at determining orbital or linear elements, stellar masses and verification of the evolutionary models.

- Description:

Improvement concerning both the quantity and quality of the collected observations of double and multiple stars is expected. Better and more numerous input data will result in a more precise calculation of the astrophysical parameters, especially in the case of main-sequence stars. It is of importance to observe as many multiple stars as possible by using different methods, in addition to speckleinterferometric observations, to have at our disposal also line-of-sight velocities determined spectroscopically over sufficiently long time intervals and/or light curves obtained photometrically and data obtained even polarimetrically, because then a comprehensive analysis of their physical, dynamical and kinematical properties, as well as understanding and studying of their evolution, become possible.
We will keep on sending our results to the proper international centres in order to enable other researchers to use these data. Observations and data treatment are foreseen to be performed. The measurements will be sent to international databases, in particular, newly calculated orbits or linear elements and improved elements of the already existing ones. A new method of measuring orbit quality will be developed wherein the correlation coefficients between orbital elements and the condition matrix of the normal equations for orbit grade calculation are used. This was started in the framework of a master thesis (already defended), the author of which is Ivana Milić and which is entitled “Correlations of Orbital Elements of Visual Binaries”. The total masses of star pairs, dynamical parallaxes and other astrophysical parameters are foreseen to be determined. The software for automatic determination of relative coordinates between the components of visual double stars, started in the framework of the master work (already defended) of Viktor Radović, entitled “Determination of Relative Coordinates of Visual Double

Stars by applying the Fourier Transformations", will be further developed. Applying the Fourier transformations in the treatment of CCD frames of these pairs one reduces the time needed for treating a large number of CCD frames. The software has been tested and verified on a sample of 1650 CCD frames for 165 double or multiple stars obtained with the 2 m telescope at the NAO Rozhen in Bulgaria in October 2011.

In the framework of this proposed programme we want to perform the following activities:

1. Observations of selected double and multiple stars;
2. Reduction and obtaining of position angles and separations for the components of pairs ;
3. Calculation of the orbital or linear elements, determination of stellar masses and other parameters;
4. Improvement of the methods to compute accurate orbits, in particular from very short arcs;
5. Including spectroscopic, photometric and polarimetric observations when it is possible;
6. Development of new methods to compute orbit grades.

- Conclusion:

The list of double and multiple stars, because of the large number, is given in the attachment (DS-list) with all necessary elements. Each object should be observed five times (5 exposures) in B filter and five times (5 exposures) in V filter. During each Observational Cycle we need at least 3 nights at 1.4m telescope for framing our objects.

- References:

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