PRESS RELEASE

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German high-school students involved in an astronomical research project on cataclysmic variable stars

Based on the article "A long-term optical and X-ray ephemeris of the polar EK Ursae Majoris", by K. Beuermann et al.

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***Astronomy & Astrophysics* publishes the results of an unusual research project, by a team involving German high-school students. They present an accurate, long-term ephemeris of the cataclysmic variable EK Ursae Majoris, obtained using a professional remotely-controlled telescope.**

This week, *Astronomy & Astrophysics* publishes a somewhat unusual research article because it is co-authored by German high-school students. Led by astronomer Klaus Beuermann (University of Göttingen, Germany), the team [1] involves a secondary school physics teacher, three students from two high schools in Göttingen [2], and three professional astronomers. The team made use of a remotely-controlled 1.2-meter telescope in Texas [3], funded by the Alfried Krupp von Bohlen und Halbach Foundation for the expressed purpose of making such resources available to schools as well as professional astronomers. The students, S. Paik, A.-M. Ploch, and J. Zachmann, and their teacher, J. Diese, observed the light variations of the faint (19th magnitude) cataclysmic variable EK Ursae Majoris (EK UMa) over two months.

Cataclysmic variable research is a field where the contributions of small telescopes has a long tradition. Cataclysmic variables are extremely close binary systems containing a low-mass star whose material is being stripped off by the gravitational pull of a white dwarf companion. Due to the transfer of matter between the stars, these systems vary dramatically in brightness on timescales in the whole range between seconds and years. This largely unpredictable variability makes them ideal targets for school projects, particularly since professional observatories are generally unable to provide enough observation time for regular monitoring.

An accurate ephemeris is needed to keep track of the orbital motions of the two stars, but none was available because EK UMa is faint in the optical range and requires a long-term observation of the light variations. The strong magnetic field of the white dwarf turns the light of the hot matter striking the surface of the white dwarf into two "lighthouse" beams. By measuring the times of the minimum between the beams, the group was able to determine an orbital period accurate enough to keep track of the eclipse that took place in 1985, over 100 000 cycles earlier. By combining their own measurements with those made by the *Einstein*, ROSAT, and EUVE satellites, they estimated the orbital period over 137 000 cycles to an accuracy of a tenth of a millisecond. Surprisingly, the orbital period is extremely stable, although the period of such very close binaries is expected to vary due to the presence of third bodies and magnetic activity cycles on the companion star.

The pupils were involved in the various tasks of the research project: observations, analysis of the CCD images, production and interpretation of light curves, and access to the archival satellite data. They participated in all the steps of a real research program, from initial observations to the publication process, and the result they obtained bears scientific significance. Team leader K. Beuermann concluded: *"Although it is fun to perform one's own remote observations with a professional telescope from the comfort of a normal school classroom, it is even more satisfying to be involved in a project that provides new and publishable results rather than to perform experiments with predictable outcomes."*

Figure 1. F*rom the left: Klaus Beuermann (group leader), Jens Diese (back,teacher), and the high-school students Joshua Zachmann (front), Alexander-Maria Ploch (back), Sang Paik (front). JD, JZ, and AMP are from the Max-Planck-Gymnasium, SP is from the Felix-Klein-Gymnasium. Team members Axel Schwope and Frederic Hessman are not in the picture.*

[1] The team includes a secondary school physics teacher, Jens Diese, three 12th grade pupils, Sang Paik, Alexander-Maria Ploch, and Joschua Zachmann, and three professional astronomers, Klaus Beuermann, Frederic Hessman (Univ. Göttingen), and Axel Schwope (AIP, Postdam).

[2] Max-Planck-Gymnasium/Göttingen, Felix-Klein-Gymnasium/Göttingen

[3] The telescope used for this project is operated by the Univ. of Göttingen, the Univ. of Texas at Austin, and the South African Astron. Obs.

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