COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS
Number **5474**

Konkoly Observatory
Budapest
3 November 2003
HU ISSN 0374 - 0676 (print)
HU ISSN 1587 - 2440 (on-line)

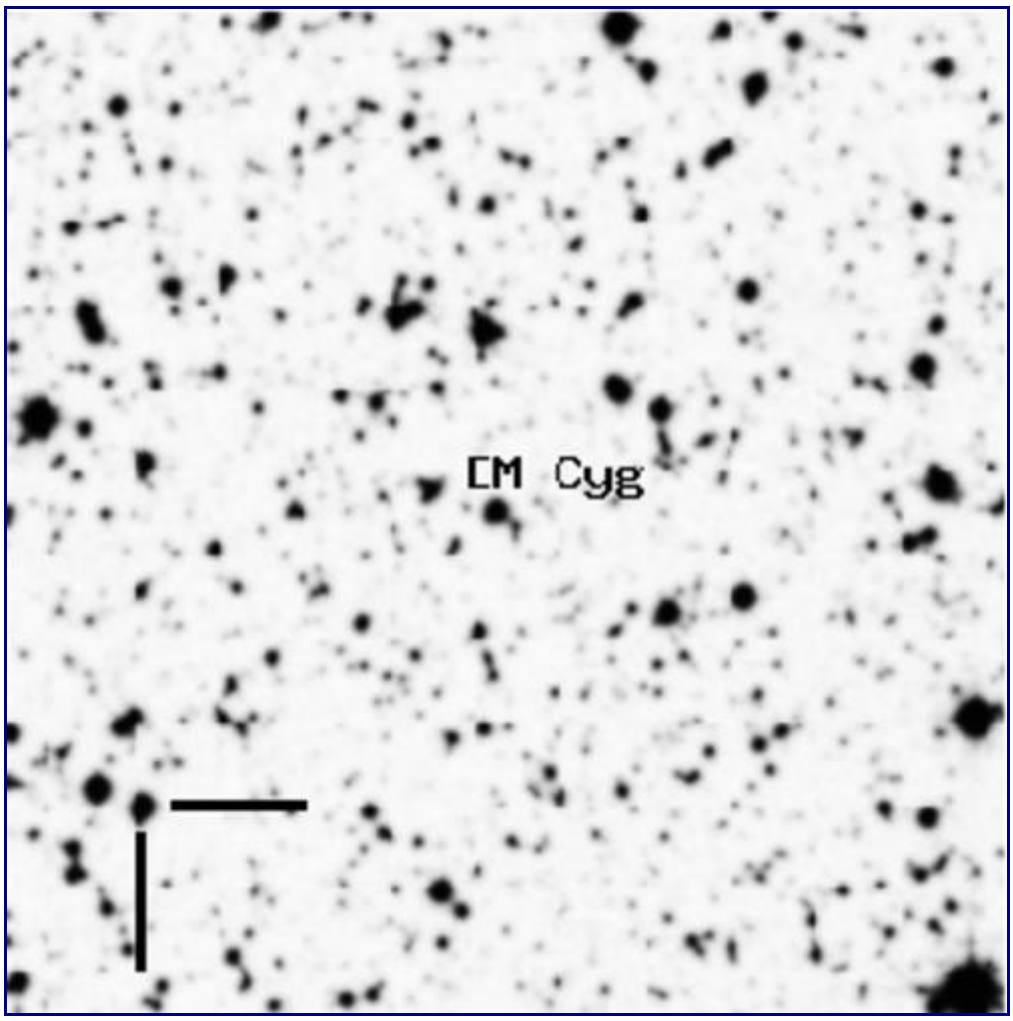
New Variable Star in the Field of EM Cyg

Spogli, Corrado[1]; Fiorucci, Massimo[1]; Dolci, Mauro[2]; Raimondo, Gabriella[2]

(1) Dipartimento di Fisica, Università di Perugia, Via A. Pascoli 06123 Perugia, Italy
(2) INAF - Teramo Astronomical Observatory, Collurania, Teramo, Italy

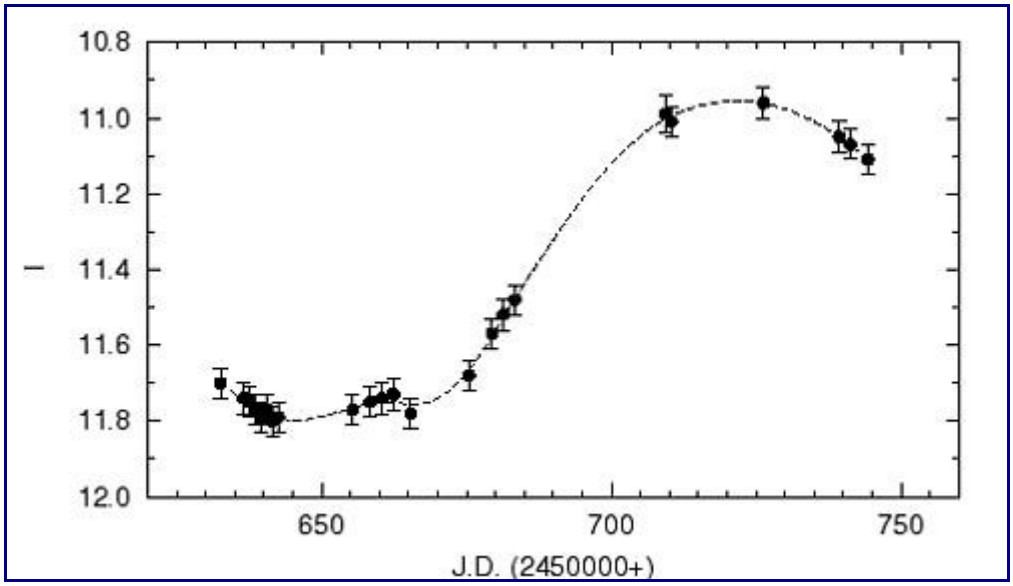
Abstract: A new variable object is identified in the field of EM Cyg. Color indices are very red, and the near-infrared spectrum shows the feature of a cool late-type star, probably a semiregular LPV.

During the analysis of our photometric images in the field of EM Cyg, we have found an unidentified extremely red object ($V-I_c$ =~5) that shows variations of some tenths of magnitude. The position is RA = $19^h38^m48^s.3$, DEC = +30°28'58" (J2000); Fig. 1 shows the finding chart.

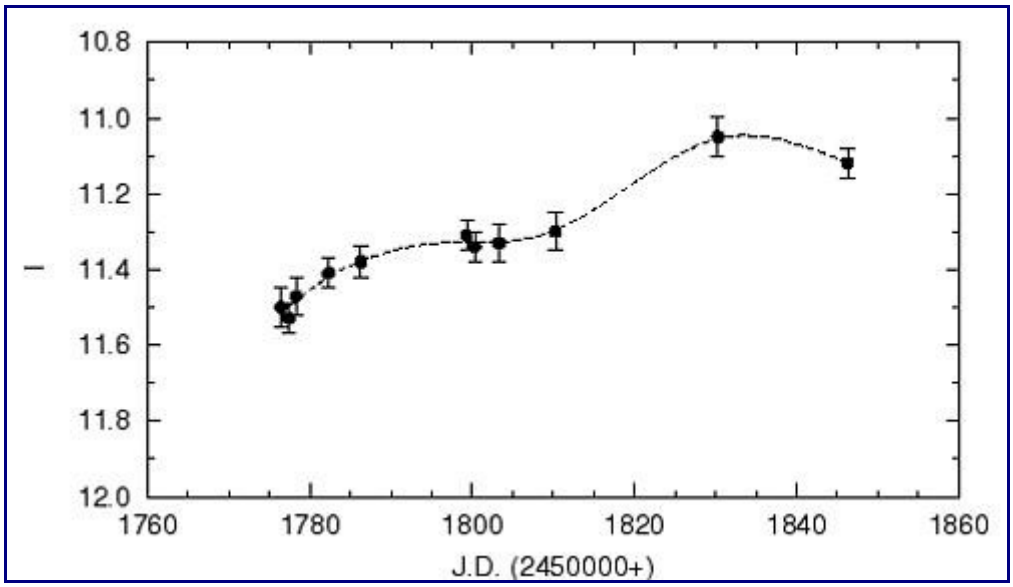


Finding chart of the new variable, centered on the dwarf nova EM Cyg. North is on the top, East on the left; the field is 5'×5' wide.

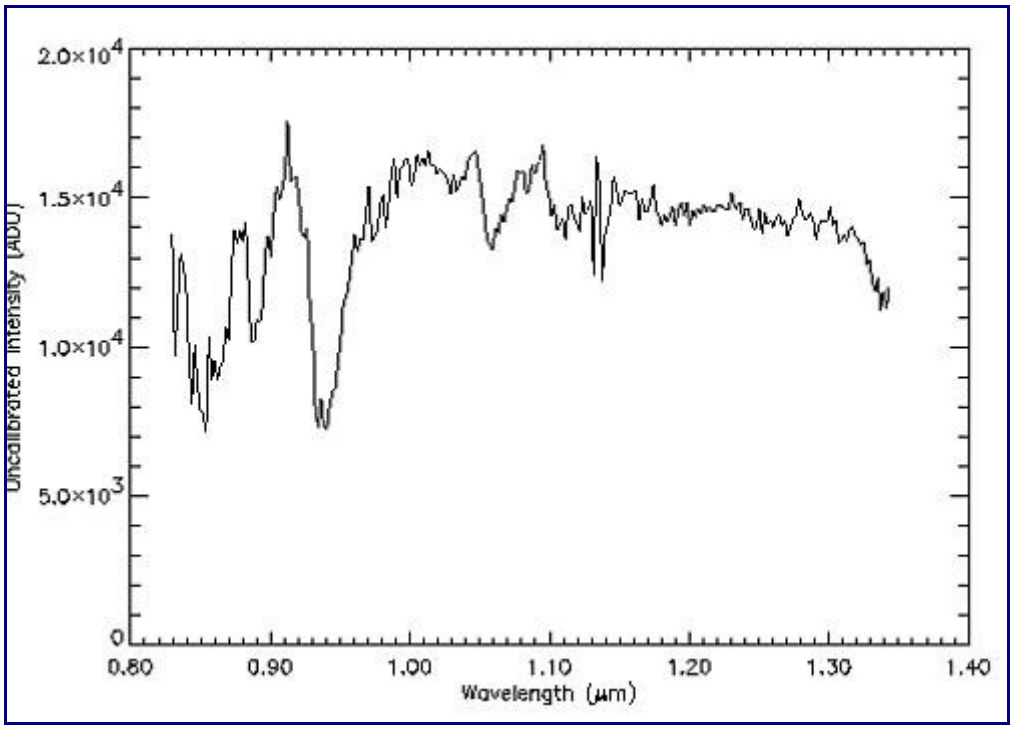
From the archival data of the Perugia and Teramo Observatories, we have verified that the object has been variable since the first CCD frames (in 1997) obtained for the monitoring of the dwarf nova EM Cyg. However, the identification is recent because of the slow variations.



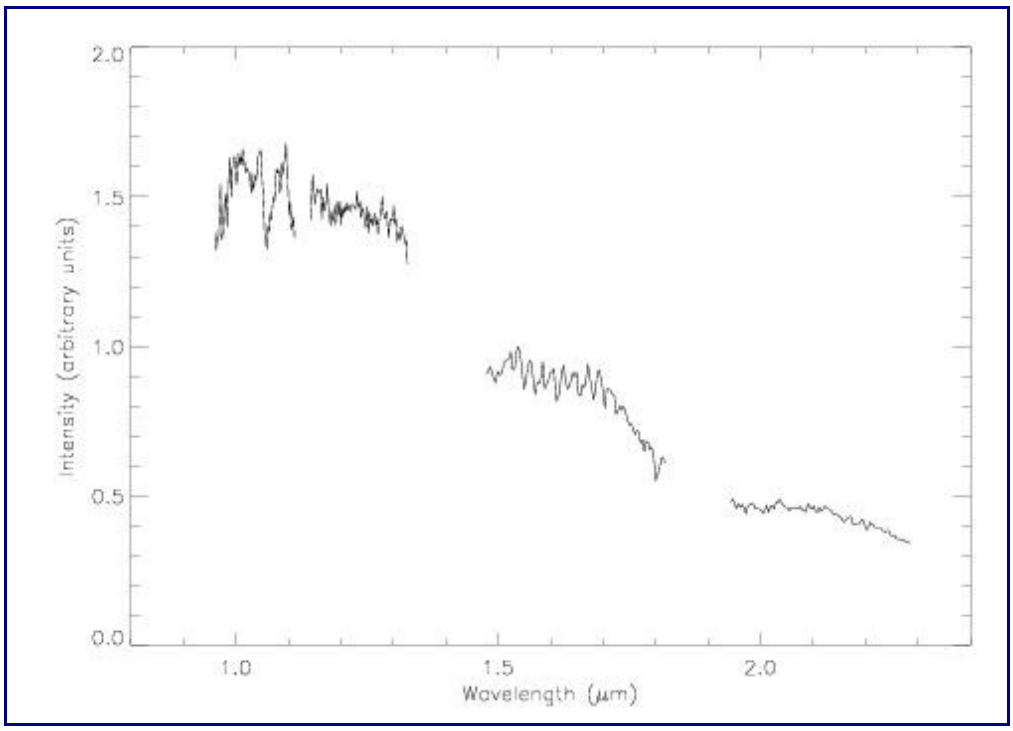
I_c light curve from July to October, 1997



I_c light curve from August to October, 2000



I-J spectrum of the variable. We have identified the TiO 0.85μm, VO 1.06μm, TiO 1.10μm bands



The spectral energy distribution of the variable is consistent with a 2800-3000 K star. In the H part of the spectrum we have identified the nine CO bands from 1.55 to 1.72 μm.

The photometric data were obtained with the 0.72 m telescope at the Teramo Astronomical Observatory, and the 0.40 m Automatic Imaging Telescope at the Perugia University Observatory. Both telescopes are equipped with CCD camera and BVR_cI_c Johnson-Cousins broad-band filters. The instruments used and the photometric techniques have already been described in Spogli et al. (1998, 2000). The data are obtained in differential photometry using the calibration stars reported by Misselt (1996), and Spogli et al. (2003). Figs 2 and 3 show the I_c light curve of the variable during 1997 and 2000. Variability is confirmed also with the sparse data obtained in 1998, and 2002. The R_cI_c extreme values and the mean color indexes are summarized in Table 1. Our V data do not cover all the variation amplitude, while in the B band the source is fainter than 18.5 mag. However, results are uncertain for the presence of a faint star near the variable.

Table 1

R_c max	R_c min	I_c max	I_c min	$\langle V-R_c \rangle$	$\langle R_c-I_c \rangle$	$\langle V-I_c \rangle$
13.7	14.8	11.0	11.8	2.0	3.1	5.1

From the maps of dust infrared emission (Schlegel et al., 1998) we can estimate the reddening: A_B=~2.2, A_V=~1.7, A_R=~1.3, A_I=~1.0. It is evident that the source is very red, and this reddening cannot be due to interstellar absorption alone. It was positively detected by 2MASS (J = 8.55±0.02, H = 7.56±0.02, Ks = 7.04±0.02, Cutri et al. 2003), and MSX (A = 0.20±0.02 Jy, Egan et al. 1999). There is also a radio source centered =~10 arcsecs near the variable, but it is not clear if the radio emission is correlated to the variable star. The NVSS Catalogue (Condon et al., 1998) reports an extended 1.4GHz source with major and minor axes less than 31.4 and 25.9 arcsecs, respectively. Also the WENSS Catalogue (de Bruyn et al., 1998) reports the presence of a 325 MHz source with a positional accuracy of 5-10 arcsecs.

For a proper identification of the variable, we have used the SWIRCAM low-resolution

spectrometer (R~300) at the AZT-24 1.1m telescope of the Campo Imperatore Observatory. The observations were made in September 4th, 2002. Figs 4 and 5 show that the source is a cool-star (T_{eff} = 2800-3000 K), with large TiO, VO and CO absorption bands. Our conclusion is that the star is a long-period variable, probably a semi-regular. From the observations of this year we expect to have more constraints to find the average period.

References:

Condon, J. J., Cotton, W. D., Greisen, E. W., et al., 1998, AJ 115, 1693 (1998AJ....115.1693C)

Cutri R.M., Skrutskie M.F., Van Dyk S., et al. 2003, University of Massachusetts and Infrared Processing and Analysis Center (IPAC/California Institute of Technology) (2003) (2003yCat.2246....0C)

de Bruyn G., Miley G., Rengelink R., et al., 1998, WENSS Collaboration NFRA/ASTRON and Leiden Observatory (2000yCat.8062....0D)

Egan M.P., Price S.D., Moshir M.M., et al., 1999, Air Force Research Lab. Technical Rep. AFRL-VS-TR-1999-1522 (2001yCat.5107.....E)

Misselt, K. A., 1996, PASP, 108, 146 (1996PASP..108..146M)

Schlegel, D. J., Finkbeiner, D. P., Davis, M., 1998, ApJ 500, 525 (1998ApJ...500..525S)

Spogli, C., Fiorucci, M., Raimondo, G., 2000, IBVS, 4944 (IBVS N°.4944)

Spogli, C., Fiorucci, M., Raimondo, G., 2003, IBVS, 5365 (IBVS N°.5365)

Spogli, C., Fiorucci, M., Tosti, G., 1998, A&AS, 130, 485 (1998A&AS..130..485S)