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COMMENTS ON "INFRARED PHOTOMETRY OF V1057 CYG" BY MENDOZA (1971)

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RESUMEN

Las contribuciones mexicanas en los años setenta están bien representadas por el trabajo observacional en V1057 Cyg de E. E. Mendoza V. en el Boletín de los Observatorios de Tonantzintla y Tacubaya 1971, 6, 37, 135. Ahí Mendoza presenta evidencia de una de las propiedades más importantes de los ahora llamados FUOrs: su exceso infrarrojo.

ABSTRACT

Mexican astronomy contributions in the seventies in well represented by the observational work on V1057 Cyg of E. E. Mendoza V. in the Boletín de los Observatorios de Tonantzintla y Tacubaya 1971, 6, 37, 135. Mendoza presents evidence of one of the most important properties of the now called FUors: their infrared excess.

Key Words: stars: individual (V1057 Cyg) — stars: pre-main sequence

Stimulated by the seminal work by Herbig (1977), the FU Orionis phenomenon has attracted increasingly attention in recent years, probably because we still do not understand them and because it is a rare phenomenon observed in low mass stars. Several reviews on the subject have been presented by Herbig (1966, 1989), Reipurth (1990), Hartmann, Kenyon, & Hartigan (1993), Kenyon (1995a,b), Hartmann & Kenyon (1996), among others.

Hartmann & Kenyon (1996) present an overview of the observational properties of FU Ori objects:

- Remarkable class of YSO with outbursts of 5 mag or more (Herbig 1977).
- Spatially and kinematically associated with star-forming regions.
- Time rise is short (1–10 yr) but the decay timescales are from decades to centuries.
- They exhibit also distinctive spectroscopic properties, such as wavelength-dependent spectral types.
- In outburst they exhibit F-G supergiant optical spectra, and in the near-infrared they exhibit K-M supergiant spectra dominated by CO overtone absorption.
- They also exhibit double-peaked broad absorption-line profiles in Balmer lines, specially observed in Hα.
- FU Orionis objects also show distinctive reflection nebulae, many are heavily extincted and all have large infrared excesses of radiation.

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The discovery of the strong infrared excess property that all FU Ori objects exhibit started in the 70s by the pioneer work of infrared observers. Motivated by Haro's (1971) results, Mendoza (1971a) obtained infrared photometry *JHKL* for V1057 Cyg; its spectral energy distribution at visible *UBVRI* (Mendoza 1971b) and infrared wavelengths revealed that both FU Ori and V1057 Cyg are similar objects. Mendoza concludes: "we may say that, there is sufficient evidence to expect that the brightening of V1057 Cygni is a manifestation of a similar event that caused the brightening of FU Orionis." I am sure that Eugenio Mendoza is delighted with the recent observations of the spectral energy distribution of V1057 Cyg and its infrared evolution shown in Ábrahám et al. (2004) that spans the whole infrared regime, and by Herbig et al. (2003) result that its brightness decline can be represented by a continuous change in radius and surface brightness of a rapid rotator.

As Rodríguez et al. (1990) describes the challenging FUors: "Perhaps the most difficult phenomenon to understand in our present theoretical framework for early stellar evolution." Different theoretical models have been proposed such as: disk instability (Hartmann & Kenyon 1996; Kley & Lin 1999), intermittent accretion (Vorobyov & Basu 2006), interaction with a planet (Clarke et al. 2005), interaction with a companion (Reipurth & Aspin 2004), interaction with another member of a dense cluster (Pfalzner 2008), and, the recent, an angular momentum crisis (Herbig 2009). The latter described elegantly by G. Herbig: "Given the evidence of a quasi-permanent outflow at V1057 Cyg, the hypothesis is advanced that a FUor outburst may be the result of a rapidly rotating TTS having contracted to a point of rotational instability, at which time it sheds enough material and angular momentum to resume contraction, until the next such event."

REFERENCES

Ábrahám, P., Kóspál, Á., Csizmadia, Sz., Kun, M., Moór, A., & Prusti, T. 2004, A&A, 428, 89

Clarke, C., Lodato, G., Melnikov, S. Y., & Ibrahimov, M. A. 2005, MNRAS, 361, 942

Haro, G. 1971, Inf. Bull. Variable Stars, 565, 1

Herbig, G. H. 1966, Vistas in Astronomy, 8, 109

__________. 1977, ApJ, 217, 693

__________. 2009, AJ, 138, 448

Herbig, G. H., Petrov, P. P., & Duemmler, R. 2003, ApJ, 595, 384

Hartmann, L., & Kenyon, S. J. 1996, ARA&A, 34, 207

Hartmann, L., Kenyon, S., & Hartigan, P. 1993, in Protostars and Planets III, ed. E. H. Levy & J. I. Lunine (Tucson: University Arizona Press), 497

Kenyon, S. J. 1995a, RevMexAA (SC), 1, 237

__________. 1995b, Ap&SS, 223, 3

Kley, W., & Lin, D. N. C. 1999, ApJ, 518, 833

Mendoza V., E. E. 1971a, ApJ, 169, L117

__________. 1971b, Bol. Obs. Tonantzintla Tacubaya, 6, 95

Pfalzner, S. 2008, A&A, 492, 735

Reipurth, B. 1990, IAU Symp. 137, Flare Stars in Star Clusters, Associations and the Solar Vicinity, ed. L. V. Mirzoyan, B. R. Petterson, & M. K. Tsvetkov (Dordrecht: Kluwer), 229

Reipurth, B., & Aspin, C. 2004, ApJ, 608, L65

Rodriguez, L. F., Hartmann, L. W., & Chavira, E. 1990, PASP, 102, 1413

Vorobyov, E. I., & Basu, S. 2006, ApJ, 650, 956