

# First study of magnetic fields and magnetospheric accretion processes in Class I protostars, with SPIRou

L. Drouglazet (1); E. Alecian (1); A. Sousa (1); P.I. Cristofari (2); J. Bouvier (1); C. Dougados (1); G. Duchêne (1,3); C.P. Folsom (4); H. Nowacki (5); K. Perraut (1); O. Kochukhov (6)

(1) Univ. Grenoble Alpes; (2) Leiden Observatory, Leiden University; (3) Department of Astronomy, Univ. of California; (4) Tartu Observatory, Univ. of Tartu ; (5) Univ. Cote d'Azur, Observatoire de la Cote d'Azur; (6) Department of Physics and Astronomy, Uppsala University

Magnetism plays a fundamental role in the early evolution of stars, regulating star–disk interactions, angular momentum transfer, and accretion processes. However, the properties of magnetic fields and the nature of magnetospheric accretion during the embedded protostellar phase remain poorly constrained.

SPIRou, the near-infrared spectropolarimeter at the Canada–France–Hawaii Telescope (CFHT), provides a unique opportunity to investigate simultaneously the magnetic and accretion properties of young stellar objects. Within the PROMETHEE (Protostellar Magnetism: Heritage vs. Evolution) project, we obtained spectropolarimetric observations of a sample of 18 Class I and Flat-Spectrum (FS) protostars, allowing us to detect and characterize their magnetic fields and study their accretion lines.

In this talk, I will present the results from these SPIRou observations. In particular, I will report the first measurements of the large-scale magnetic fields in Class I sources, and their implication on the star-disk interaction. I will also describe our analyses of accretion through emission lines and their connection with the measured magnetic fields, providing new insights into magnetospheric accretion processes at the protostellar stage. Finally, I will discuss the implications of these results for our understanding of magnetic field evolution during star formation and present future prospects combining SPIRou data with complementary observations, such as GRAVITY+, to constrain the geometry of accretion flows.