

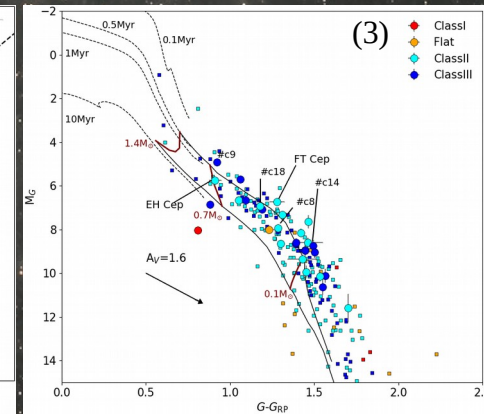
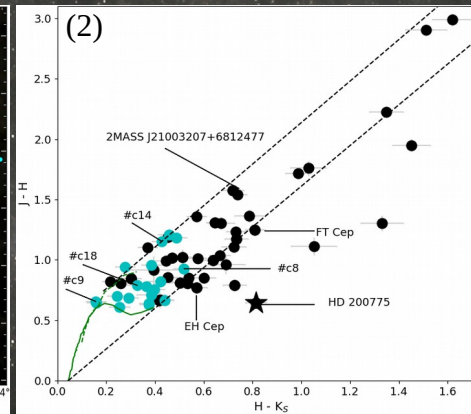
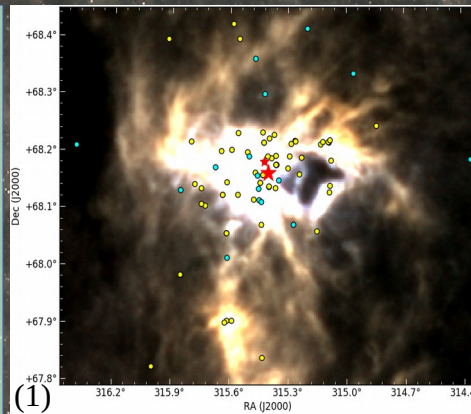
Spectroscopic Study of Young Stars towards NGC 7023

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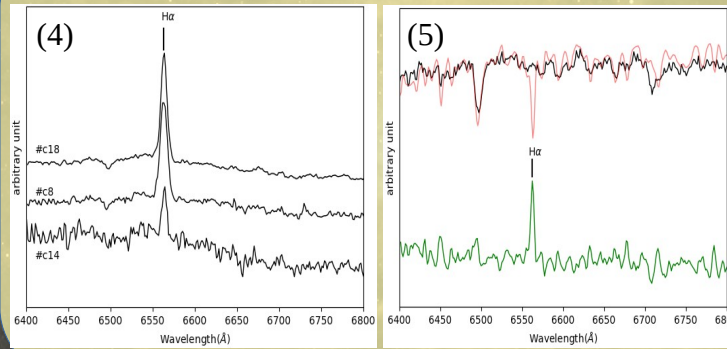
Introduction

NGC 7023 is a bright reflection nebula, which is illuminated by a Herbig Be star HD 200775. It is followed by a highly extincted filament LDN 1172, resembling a head-tail morphology. This nebula is located in the constellation Cepheus.

Based on near-infrared photometry and optical spectroscopy, 58 young stellar objects (YSOs) have been detected till date. Based on the latest *Gaia* DR2, we found 20 more sources which show kinematics similar to the known YSOs, so they could possibly be young sources. In order to confirm their young nature, we made an attempt to find H α emission in their spectra using HFOSC, attached with 2-m HCT. 3 of the 4 new sources for which we have obtained optical spectra show H α in emission. We also studied 3 known YSOs, using TIRSPEC, to study their Br- γ emission and found filled-in emission in these spectra.

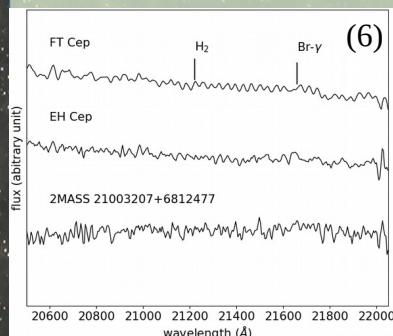


Optical spectra of 4 comoving sources using HFOSC

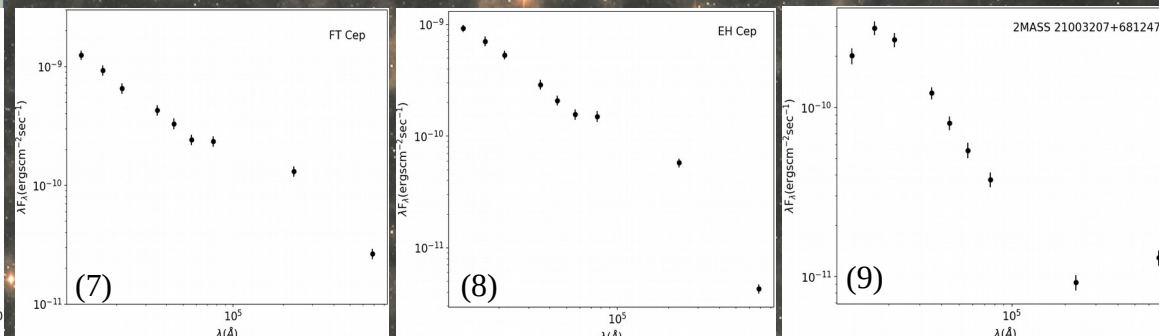


id	RA (°)	Dec (°)	Spectral Type	Halpha Eq. Width (Å)
c8	315.422157	68.182326	M1	-15.0 \pm 1.5
c9	315.439309	68.113265	K2	-0.7 \pm 0.1
c14	315.501565	68.192440	M3	-4.1 \pm 0.4
c18	316.150453	68.498418	M1	-13.0 \pm 1.3

Near-IR spectra of YSOs using TIRSPEC



Spectral Energy Distributions (SEDs) of 3 YSOs



Summary

The sources surrounding HD 200775 are predominantly of Class II and III and of ages 1-3 Myr. Based on the optical and near-infrared spectroscopic study of the YSOs and co-moving sources we found that a number of them do not show signature of accretion although they are young. This could lead to a probability of variable line emission in these sources. A good number of sources have already been identified as variable H α emission YSOs in the literature. We found emission and filled-in emission in hydrogen lines in the spectra of our targets.