

### [SF-07] The Color Variability Monitoring of HBC722

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We present the results of SDSS  $r$ ,  $i$  and  $z$  band photometry for HBC722 (also known as LkHa 188 G4, PTF10qpf and V2493 Cyg), with Camera for Quasars in Early uNiverse (CQUEAN) attached to 2.1m Otto Struve telescope at McDonald Observatory, USA. HBC722 is a newly erupted FU Orionis type object, which produced optical outburst ( $\Delta V=4.7$  mag) over a year that peaked in 2010 September. We carried out the monitoring observations during 48 nights from 2011 April to 2012 June to check the short-term and the long-term variabilities for chasing the Keplerian rotation of the system. Comparing the photometric results of  $r$ ,  $i$  and  $z$  band, we describe the color variability which is related to the physical properties of the system like circumstellar disk and accretion process.

### [SF-08] Water and Methanol Maser Observations toward NGC 2024 FIR 6 with KVN

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NGC 2024 FIR 6 is a star formation site in Orion and may contain a hypercompact H II region, FIR 6c, and a low-mass protostar, FIR 6n. The FIR 6 region was observed in the water maser line at 22 GHz and the methanol class I maser lines at 44, 95, and 133 GHz, using KVN in the single-dish telescope mode. The water maser spectra displayed several velocity components and month-scale time variabilities. Most of the velocity components may be associated with FIR 6n while one component was associated with FIR 4, another young stellar object in the 22 GHz beam. A typical life time of the water-maser velocity-components is about 8 months. The components showed velocity fluctuations with a typical drift rate of about 0.01 km/s/day. The methanol class I masers were detected toward FIR 6. The methanol emission is confined within a narrow range around the systemic velocity of the FIR 6 cloud core. The methanol masers did not show a detectable time-variability. The methanol masers suggest the existence of shocks driven by either the expanding H II region of FIR 6c or the outflow of FIR 6n.