

Poster: Statistical research of the periodic flux variability in high-mass star-forming regions through 6.7 GHz methanol masers monitored with Hitachi 32-m

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We initiated a long-term and highly frequent monitoring project toward 442 methanol masers at 6.7 GHz (Dec > -30 deg) using Hitachi 32-m radio telescope in Dec 2012. The observations have been carried out daily, monitoring a spectrum of each source with intervals of 9 days. In Sep 2015, the number of the target sources and intervals were redesigned into 143 and 5 days. This monitoring provides us complete information how many sources show periodic flux variations in high-mass star-forming regions, which have been detected in 20 sources with periods of 30-670 days so far (e.g., Goedhart et al. 2004). The periodic flux variations with short timescale must be a unique tool to investigate high-mass protostars themselves and their circumstellar structure on a very tiny spatial scale of 0.1 au, where cannot be spatially resolved even with the future extended-ALMA. In particular, the periodic variations showing continuous pattern can be caused by pulsation of high-mass protostars with kappa mechanism (Inayoshi et al. 2013), and these sources are unique probes to understand physical parameters, such as a mass, radius, and an accretion rate onto the stellar surface (spatial scale < 0.1 au), through a period-luminosity (P-L) relation. In these parameters, the accretion rate is theoretically suggested to define evolutionary tracks of high-mass protostars (Hosokawa & Omukai 2009). Thus, we aim to verify the P-L relation by combining complete samples of periodic flux variations and the theoretical pulsation model. We have already obtained new tentative detections of periodic flux variations from 36 methanol sources with periods of 22-409 days. Here, we will present progress of our monitoring project as well as the latest P-L relation.

Galactic Scale