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Tri-band maser studies of star-forming regions

The new K/Q/W tri-band receivers cover a number of important maser transitions of methanol, water, SiO and other molecules. Many of these transitions are excited in the vicinity of massive young stellar objects (MYSOs). Different molecules and transitions have different excitation mechanisms and may originate in different parts of the MYSO's environment, such as the circumstellar disk, the envelope or the outflow. The evolution of such MYSOs is relatively fast and dynamic. Single-dish (tri-band) monitoring can track the temporal flux density and spectral variability that may be caused by accretion bursts, shocks, outflows and maser cloud movements (superposition). However, only high angular resolution and astrometrically registered tri-band VLBI observations can unravel the spatial and spectral distribution of the various maser transitions to interpret the variability origin and the physical conditions in the close vicinity of the MYSO. In this talk we give an overview of the available transitions and how a combination of these can be used to obtain new information about the immediate environment of the forming star and how this advances studies of star formation.

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