

The H_2O super maser emission of Orion KL accretion disk, bipolar outflow, shell

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The H_2O super maser outbursts were observed in Orion KL in active periods 1979-1987 ($F \leq 8$ MJy) and 1998-1999 ($F \leq 4$ MJy). The line velocity was $V_{LSR} = 7.65$ km/s and line width $\Delta V \sim 0.5$ km/s. The emission was linear polarized $m \leq 75\%$. We studied structure of H_2O super maser region with VLBI angular resolution 0.1 mas or 0.05 AU. The emission was determined by high organized structure: a chain of bright ($T_b \sim 10^{16} K$) compact components (~ 0.05 AU), which are distributed along thin S-form structure 27×0.3 AU, $T_b \sim 10^{11} K$, Fig. 1. The brightest components have velocities $V \sim 7.65$ km/s. The components correspond to tangential direction of the rings, velocities of which are $V \sim \Omega R$ and rotation period is ~ 180 yrs. The highly collimated bipolar outflow 9×0.7 AU and comet-like bullets were observed in the quiescent period 1995 ($F = 1$ kJy) and second activity period 1998-1999. The central compact (0.05 AU) bright ($T_b \sim 10^{16} K$) source is ejector of bipolar outflow, which surrounded by a torus. Compact bright features are located in the outflow, which velocities are $V \sim 10$ km/s in the beginning of activity, and $V \sim 3$ km/s in the end. The helix structure of outflow is determined by precession with period $T \sim 10$ yrs. The bullets were ejected in the first period activity. Extraordinary changing of the polarization position angle $dX/dV \sim 23^\circ/\text{km/s}$ is determined by nozzle emission.

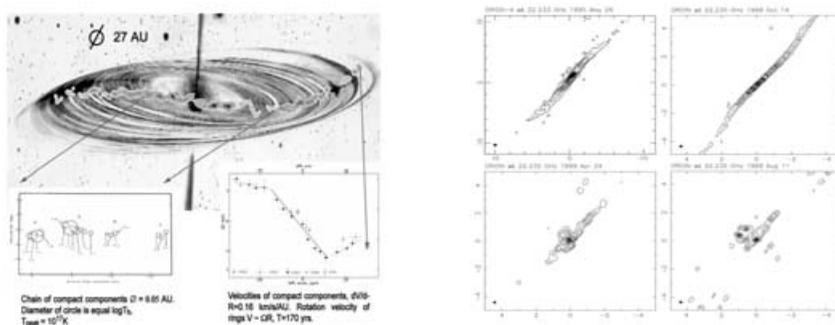


Figure 1. Accretion disk, bipolar outflow(left) Evolution of bipolar outflow(right).

Birth of a star is accompanied by the structure: torus, bipolar outflow, accretion disk and shell. The disc is divided into protoplanetary rings. Kinetic energy of the rings is transformed into bipolar outflow. Radiation and stellar wind sublimated ice and blow away H_2O molecules. The shell is amplified the structure emission of more than 3 orders of magnitude at velocity $V = 7.65$ km/s.

Reference

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