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Spatio-Kinematics of the Massive Star Forming Region NGC6334I during a Episodic Accretion Event

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In 2015, the massive protostellar cluster NGC6334I-MM1 flared in various maser species detected by long term monitoring at HartRAO. Followup infrared, millimetre and centimetre observations confirmed that a massive protostar MM1B ($M \sim 6.7 M_{\odot}$) inside the cluster underwent a period of high mass gain, an accretion burst. To probe the effects of such a transient event on the native protostellar environment, multi-wavelength, multi-epoch and multi-scale observations are required. We present high-resolution relative proper motion observations of highly variable water masers in NGC6334I during the onset of the accretion burst. High velocity ($\bar{v} = 85 \text{ km s}^{-1}$) proper motions were detected in five regions, CM2-W2, MM1-W1, MM1-W3, UCHII-W1 and UCHII-W3. Using velocity variance and covariance analysis, we calculated the position angle of the major axis of motions to be -79.4° centred on MM1B, showing the axis of the jet driving the CM2-W2 shock. The axis traced by water maser motion correspond to an outflow previously detected in CO emission. Complex motions in MM1-W1 indicate possible turbulent interactions between multiple outflows centred on MM1. Unpublished high resolution water maser maps of the period before, during and after the accretion burst will also be presented, showing the large effects of these bursts on protostellar environments.

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Yes

Level for award;(Hons, MSc, PhD, N/A)?

MSc

Primary author: Mr VORSTER, Jakobus (Centre for Space Research)

Presenter: Mr VORSTER, Jakobus (Centre for Space Research)

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