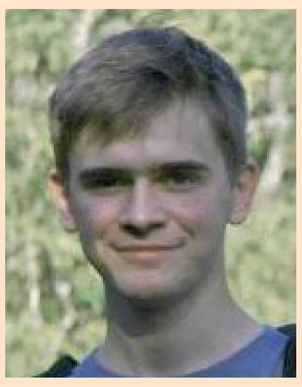

Radio emission from protostellar jets in Perseus molecular cloud

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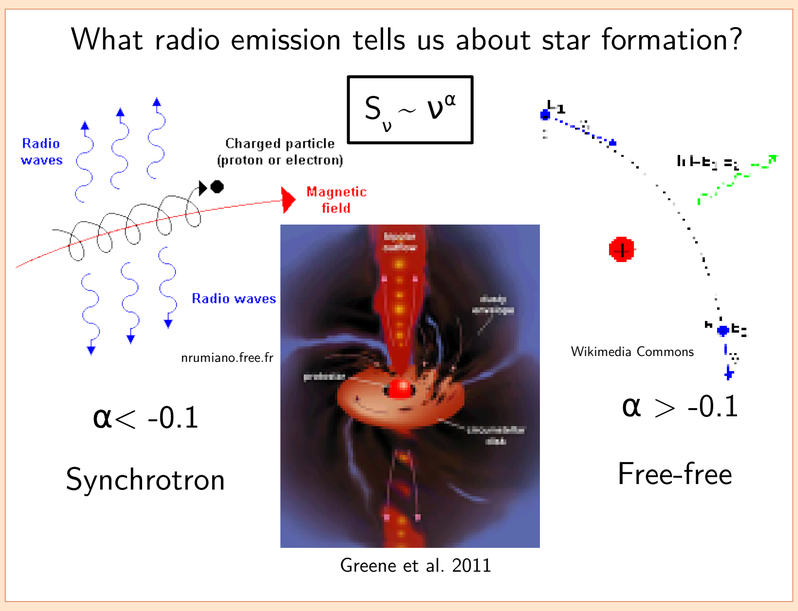
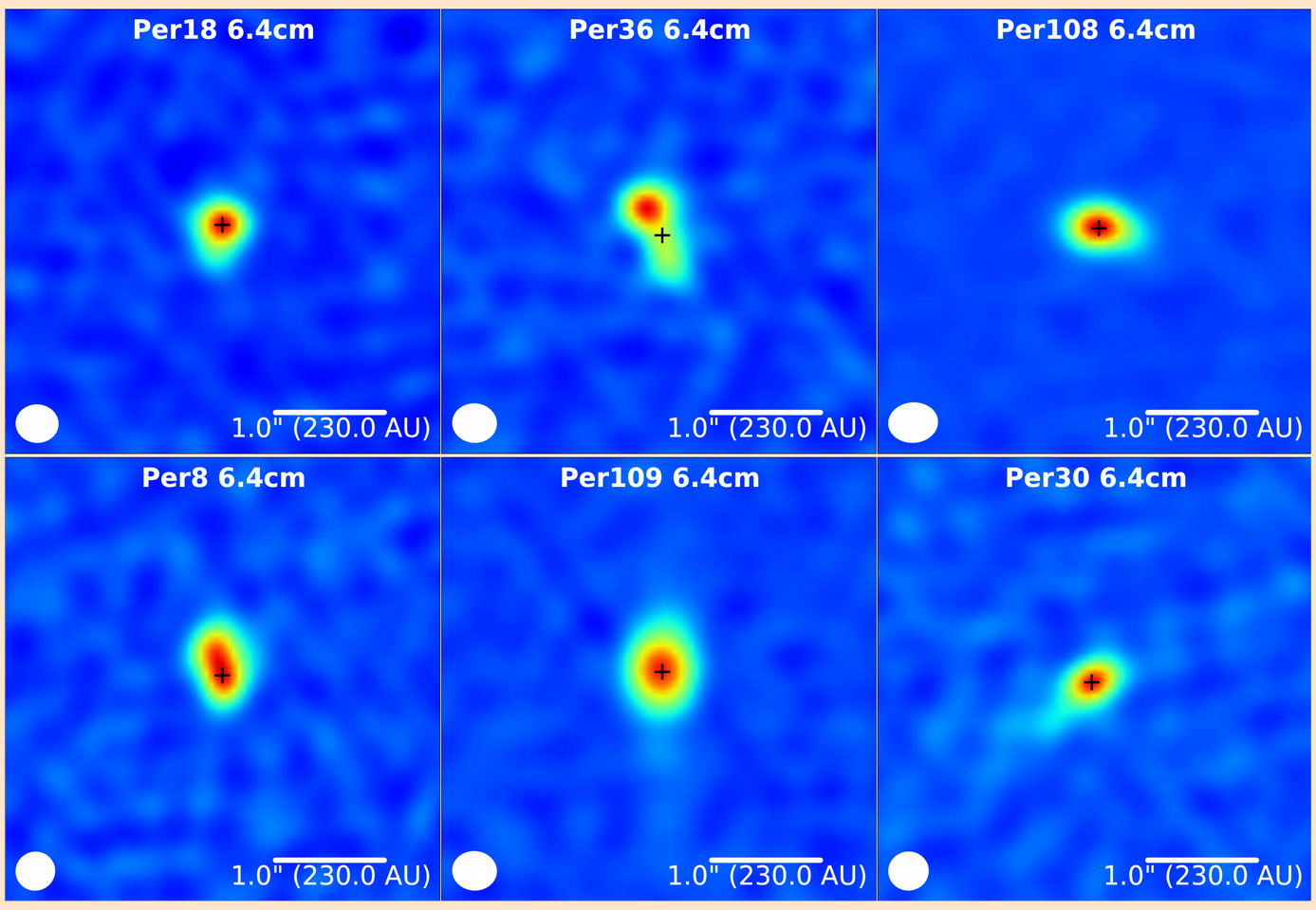
Introduction:

- Ouflows are ubiquitous in star forming regions;
- VANDAM survey (Tobin et al. 2015) targeted all known protostars in Perseus molecular cloud;
- VLA C-band observations (4 cm, 6.4 cm) provides clues about the nature of outflows tracing free-free or synchrotron emission.

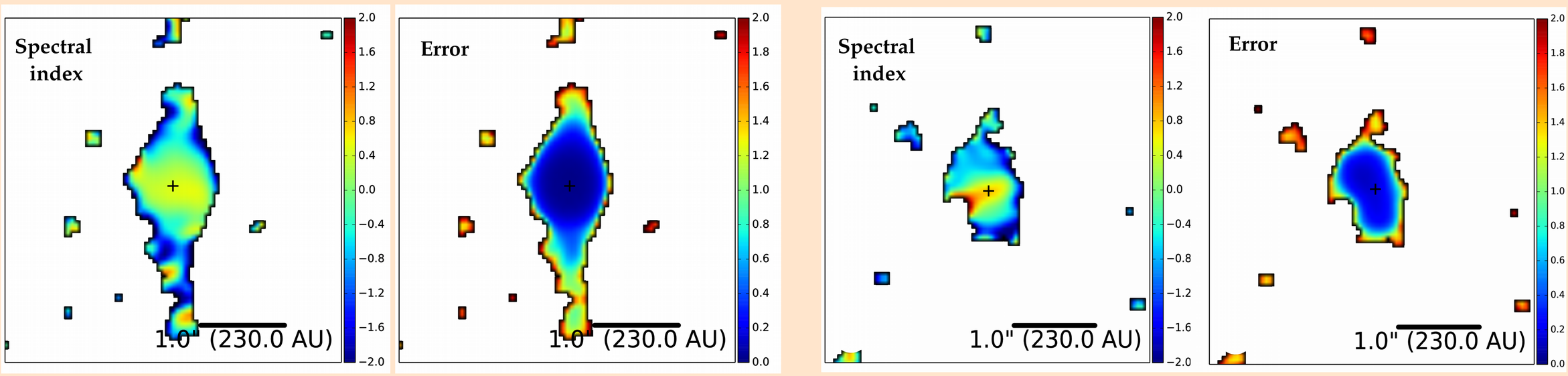


VLA 6.4 cm images of protostars



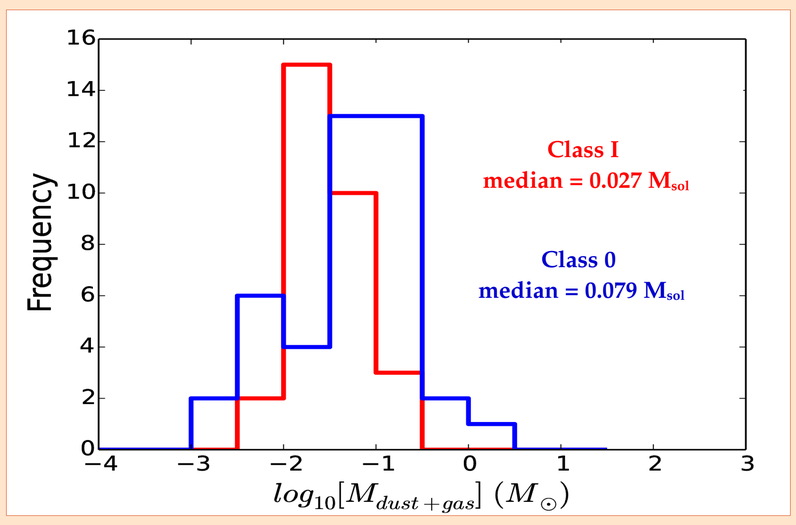
Many of the targeted sources exhibit resolved extended emission. The extension of these structures often matches the outflow directions from the infrared scattered light and CO outflow data.

Spectral index and error maps

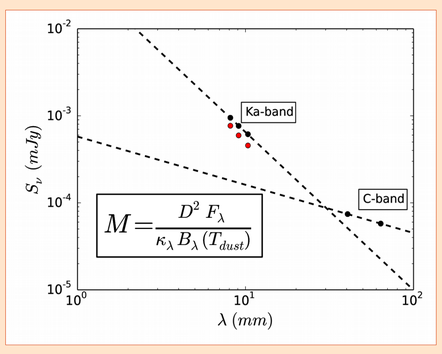


Both sources show decreasing spectral index with the distance from the central protostar. The negative values of those indices indicate that the emission is non-thermal.

Mass determination



Median dust and gas masses for Class 0 and I protostars indicate an evoluitionary trend towards lower masses for more evolved sources.

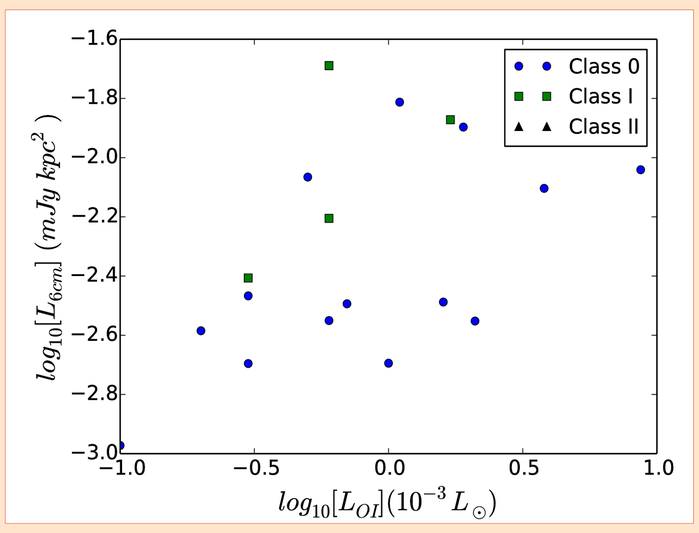


Estimated free-free component was substracted from Ka-band flux to obtain dust-only flux.

Conclusions:

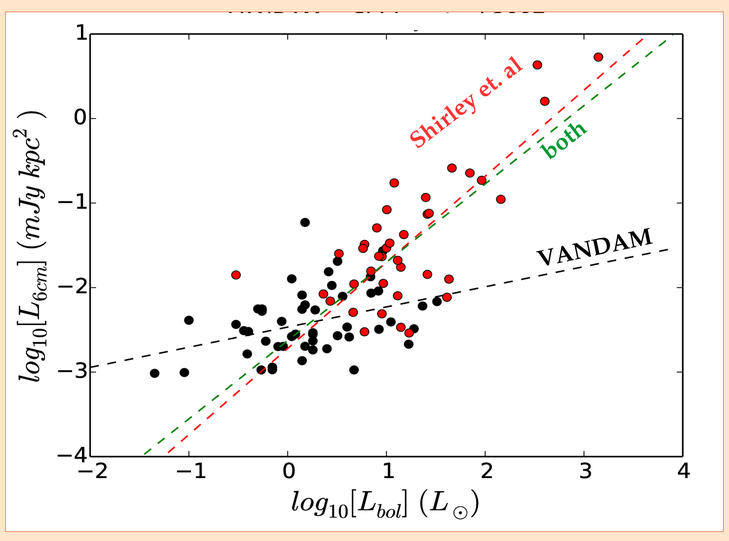
- Synchrotron emission is produced by the interaction of outflow shocks and the magnetic field within the outflow;
- The disk/inner envelope mass decreases with evolution due to accretion processes;
- FIR and radio emission traces different stages/scales of outflows;
- Our survey solidifies L_{cm} and L_{bol} correlation and indicates a need for more observations.

Comparison of radio and FIR emission



L_{cm} emission shows no clear correlation with the [O I] 63 μm emission tracing dissociative shocks in the jet (data from Karska et al. 2014).

L_{bol} and L_{cm}



A weak correlation is found between L_{cm} and L_{bol} in our source sample. The slope varies significantly from the one obtained using the Shirley et al. (2007) sample.

References: Tobin et al. 2015, ApJ, 798, 61T; Shirley et al. 2007, 667, 329S; Karska et al. 2014, A&A, 572A, 9K.

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