**Multi-scale polarization, chemistry and kinematics in the Pipe nebula**

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Our team is involved in multi-wavelength observations of the Pipe nebula across several spatial scales and my goal is to present the most relevant results of this investigation. A recent comparison between *Planck* submm data and optical data has proven that polarization by emission and absorption are remarkably consistent [1]. Both techniques show an ordered magnetic field that may be the result of the interaction between two clouds [2, 3]. We are also investigating the ionization properties of the Pipe through observations of several species such as DCO+ and $H^{13}CO+$. Preliminary results point to an unusually high ionization fraction and therefore a tighter coupling between matter and magnetic field.

I will also present results of a chemical survey that reveals a close correlation between deuteration in the cores and visual extinction [4]. One particular core, FeSt 1-457, shows chemical differentiation and polarization levels consistent with a starless core [5,6]. Finally, I will present ALMA observations toward B59, the only active core in the Pipe. Our data show impressive substructure in dust and molecular emission, suggesting that a centrifugal barrier may be the key mechanism regulating the kinematics of a young stellar object.

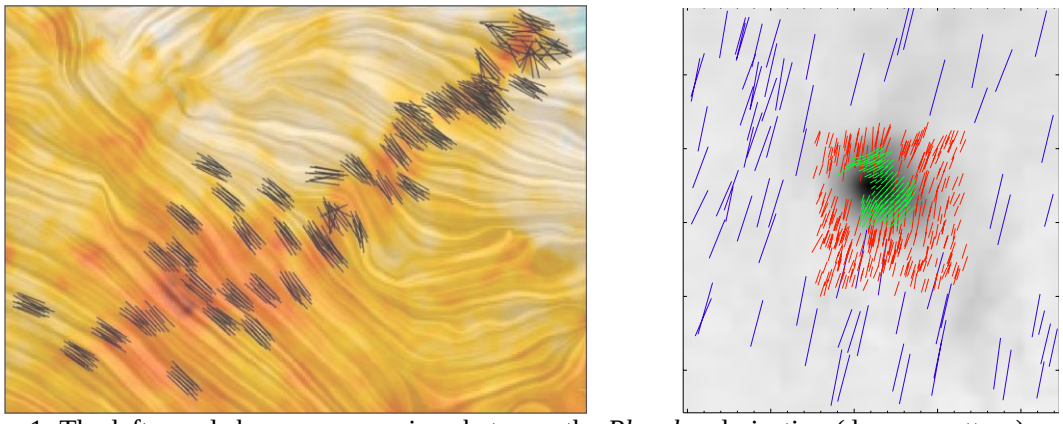

Figure 1: The left panel shows a comparison between the *Planck* polarization (drapery pattern) and optical polarization (black segments) in the Pipe nebula. The right panel shows optical (blue segments), near infrared (red segments) and submm polarization (green segments) in the prestellar core FeSt 1-457.

## References

[1] J. Soler, F. O. Alves, F. Boulanger et al., 2016, submitted.
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