Application to the 2008 CARMA Summer School

Pau Frau

Institut de Ciències de l'Espai (CSIC-IEEC)
Campus UAB, Fac. Ciències Torre C5 parell 2, E-08193 Bellaterra (Catalonia), Spain

Current status: PhD student
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Research topic: Magnetic fields in star forming regions
Contact e-mail: frau@ieec.uab.es
Advisors: Josep Miquel Girart (Institut de Ciències de l'Espai (CSIC-IEEC), Spain; girart@ieec.uab.es), Maria Teresa Beltrán (Universitat de Barcelona, Spain; mbeltran@am.ub.es)
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The main topic of my thesis focuses on the study of high-mass star-forming regions to try to understand two of the fundamental questions on this field: how do high-mass stars form?, and which role do the magnetic fields play in high-mass star-forming regions? To be able to answer these questions a deep knowledge of the initial conditions and the mechanisms involved in the star-forming process are needed.

Although it has been recently achieved a remarkable advance in understanding low-mass star-forming processes (simultaneous accretion and ejection of matter, importance of the role of the magnetic fields), dominant processes at high-mass star formation are poorly understood. Two high-mass formation mechanisms have been proposed: (i) low-mass star merging, and (ii) accretion through disks with high accretion rates (in which magnetic fields could play an important role). To distinguish between these two models represent an observational challenge, however it is the way to understand the high-mass star formation process. There are two possible ways to reach this objective: (i) to study the magnetic field properties in hot and dense molecular cores, and (ii) to look for rotating accretion disks around massive stars. Both magnetic fields and accretion disks have been probed to be important in the low-mass star-forming process, confirming the theories of star formation by magnetized molecular clouds collapse.

The main difficulty in the study of high-mass regions is because of observational constraints. Observing high-mass regions is more difficult than low-mass regions due to its lower number and its greater distance. Consequently, high-mass protostars are harder to locate and to angularly resolve. In addition, massive protostars are embedded in large amounts of gas and dust.

Instruments with high angular resolution and observing at (sub)mm wavelenghts are needed to study high-mass star-forming regions because they can penetrate closer to the star. The good performance of the new millimeter CARMA array can provide very useful data to study with high angular resolution these regions. This instrument will play an important role on my future thesis work. The attendance to the CARMA school will allow me to know the technical issues of this instrument, as well as knowing the working capabilities and data reduction process. So, as a CARMA potential user, I am very interested in attending the CARMA school to familiarize with the instrument and master its operation, to better exploit its capabilities in future observations.