

Stars and their disc - A short but complex story

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Abstract

During their formation, most young stars are surrounded by a protoplanetary disc. The angular momentum evolution of these systems is quite complex but still poorly understood despite a lot of effort and some recent breakthrough. For instance, observations indicate that stars with a disc tend to rotate more slowly even though they accrete angular momentum, and during the first 10 Myr, young low-mass stars do not seem to spin-up while they are expected to contract. To tackle this long-standing problem, I will present state-of-the-art stellar evolution models with accretion which include a self-consistent treatment of angular momentum evolution thanks to the results of dynamical multi-D MHD simulations. We explore the observed range of several parameter, such as the accretion rate history, the composition and the thermodynamics of the accreted material, as well as the large scale magnetic field strength of the star. I will show that the observed spin rate and other properties of very young stars can be explained by the complex interplay of the different processes.