Why do stars rotate so slowly ?

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Recent asteroseismology observations have shown that rotation profiles of most stars are significantly flatter than expected, especially in the radiative region. This suggests the existence of an unknown and powerful mechanism that extracts angular momentum from the stellar core to its outer parts. In this talk, I will describe global numerical simulations aimed at modeling a radiative stellar layer. For some parameters, we report the existence of a subcritical transition to turbulence due to the generation of a magnetic dynamo, very similar to the (never observed) Tayler-Spruit model. This regime significantly enhances transport in radiative zones, leading to a drastic spin-down of the inner part of the star. Because the magnetic field is mostly hidden in the deep regions of the star, these results predict the existence of intense magnetism in radiative stars where no magnetic fields could be directly observed so far.

Références

1. L. Petitdemange, F. Marcotte, C. Gissinger, *Hidden dynamo spins down radiative stars*, (*Science*, in revision)