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Stratorotational instability in a thermally stratified Taylor-Couette Flow

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Thirty years ago it was observed that for many stars the emitted energy spectrum shows an extra bump in the infrared part. This infrared excess indicates a large gaseous disk encompassing the star. Such accretion disks are regions of planet formation. Understanding the mechanisms that can result in an outward angular momentum transport is the central problem of planet formation, particularly in the theory of accretion disks. When a planet forms in a disk, angular momentum has to be carried away from the planet otherwise its rotation speed would be far too large. Only turbulence can achieve such a large angular momentum transport. Accretion disks can be turbulent even in the absence of a magnetic field. However, it is still an open question whether purely hydrodynamic instabilities are efficient enough for the momentum transport. This question can be addressed by particularly designed laboratory experiments and numerical simulations in an Taylor-Couette (TC) setup. It has been shown that classical turbulent TC flows are not efficient enough. However, adding axial stratification opens a route to a new instability. This Stratorotational Instability (SRI) has attracted attention in recent years. We show preliminary experimental and numerical results that highlight nonlinear aspects of the flow.