Many of us have enjoyed the spectacle of a spinning top influenced by friction: rotating rapidly about a stable stationary axis, the top loses slowly its angular momentum \( j \) (and energy), slows down gradually, and then, suddenly, its axis becomes unstable, the top wobbles, and an abrupt change of the tops position follows. In other words, the system undergoes a bifurcation. In the case of the tippe top, rotation about its lower point is stable at low values of angular momentum \( J \) and becomes unstable at large \( J \). Something quite similar occurs in a freely rotating dimethylsulfoxide (DMSO, \((\text{CH}_3)_2\text{SO})\) molecule. For the first time in such large polyatomic molecule a quantum bifurcation induced by a gyroscopic destabilization was observed.  

This unusual phenomenon in rotational dynamics was discovered in the rovibrational states of the bending fundamental \( \nu_{23} \) band of DMSO whose high-resolution gas phase absorption spectrum was observed along with that of \( \nu_{11} \) by Cuisset et al.\(^b\) using the exceptional properties of the AILES beamline in the Far-Infrared domain.  