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The many facets of transitional millisecond pulsars: can accretion- and rotation-powered states coexist?

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The increasingly thrilling investigation of millisecond pulsars has recently overturned a long-standing paradigm. Traditionally, these pulsars were thought to shine as rotation-powered radio and/or gamma-ray sources only after a Gyr-long, X-ray bright phase fueled by the accretion of matter from a low-mass donor star. However, transitional millisecond pulsars challenge this classification by swinging between radio and X-ray states. All transitional pulsars have also been caught in an intermediate state, featuring an X-ray luminosity lower than that in the standard accreting phase and gamma-ray emissions up to ten times greater than those recorded during the rotation state. In this context, the recent detection of coherent optical and ultraviolet pulsations from the archetype of transitional millisecond pulsars in this intermediate state hints at the persistence of a rotation-powered magnetospheric process even in the presence of an accretion disk. I will review recent multi-wavelength campaigns on confirmed and candidate transitional millisecond pulsars to test the possible outcomes of the interaction between the pulsar wind of particles and radiation and matter in an accretion disk.

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Session Classification: Experimental part: Review of the latest results