Challenging the CDM paradigm : constraining DM properties with the CMB

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To date, all evidence for Cold Dark Matter (CDM) is still purely gravitational and thus the CDM paradigm remains to be thoroughly tested. In the present work, we do so by replacing the common assumption of a pressureless perfect fluid by an imperfect fluid called Generalised Dark Matter (GDM). The standard CDM is nested in this new model which possesses far more degrees of freedom. The GDM is indeed able to model natural deviations from a pressurless perfect fluid, with non-zero equation of state, sound speed, and viscosity. Using the Planck CMB data (and various other datasets), we present here the best constraints on the GDM model to date, where all its degrees of freedom are allowed to vary independently in time in a non-parametric way.