

## Relativistic Thermodynamics in CFD codes.

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In numerical experiments of the propagation of relativistic jets produced e.g. by Supermassive Black Holes (SMBH) the covariant equation of state determines a relationship between density, pressure and temperature. While the former is proportional to the Lorentz factor and the second is invariant, one is left with different possibilities concerning temperature. The usual choice adopted in Computational Fluid Dynamics (hereafter *CFD*) is:  $T \equiv T(U^\mu p_\mu)$ , i.e. that also temperature is Lorentz invariant. Current covariant formulation of thermodynamics do not give unique predictions about the transformation of temperature among comoving reference systems. We have investigated the implications of these possibilities on the observed properties of highly relativistic components of AGNS, i.e. the infall region near the SMBH horizon and the relativistic jets. We suggest that these different environments could be testbeds of different RT models.

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