The Euler–Poisson equations in a physical vacuum

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Abstract: The Euler–Poisson equations govern gas motion under self gravitational force. In this context the density is not strictly positive, it vanishes in the vacuum region, or falls off to zero at infinity. That causes a degeneration of the hyperbolic systems. The lecture will discuss local existence theorems under these circumstances and with a polytropic equation of state $p = K\rho^\gamma$, here p is the pressure, ρ the density and $\gamma > 1$ is the adiabatic gas exponent. In particular we shall discuss whether the initial data include the static spherical solutions for various values of the adiabatic constant γ. This is a joint work with U. Brauer, Universidad Complutense Madrid.