1162-35-15 **Marcelo M. Disconzi*** (marcelo.disconzi@vanderbilt.edu), **Mihaela Ifrim** and **Daniel Tataru**. *The relativistic Euler equations with a physical vacuum boundary.*

We consider the relativistic Euler equations with a physical vacuum boundary and an equation of state $p(\varrho) = \varrho^{\gamma}$, $\gamma > 1$. We establish the following results. (i) local well-posedness in the Hadamard sense, i.e., local existence, uniqueness, and continuous dependence on the data; (ii) low regularity solutions: our uniqueness result holds at the level of Lipschitz velocity and density, while our rough solutions, obtained as unique limits of smooth solutions, have regularity only a half derivative above scaling; (iii) stability: our uniqueness in fact follows from a more general result, namely, we show that a certain nonlinear functional that tracks the distance between two solutions (in part by measuring the distance between their respective boundaries) is propagated by the flow; (iv) we establish sharp, essentially scale invariant energy estimates for solutions; (v) a sharp continuation criterion, at the level of scaling, showing that solutions can be continued as long as the the velocity is in $L^1_t Lip$ and a suitable weighted version of the density is at the same regularity level. (Received August 10, 2020)