1163-35-652 **Jinkai Li*** (jklimath@m.scnu.edu.cn) and **Zhouping Xin** (zpxin@ims.cuhk.edu.hk).

Entropy-bounded solutions to the compressible Navier-Stokes equations with far field vacuum.

The entropy is one of the fundamental physical states of a fluid. For the ideal gases, it can be expressed as a certain linear combination of the logarithms of the density and temperature in the non-vacuum region, and, in the viscous case, it satisfies an equation of highly singular in the region close to the vacuum. Due to the singularity of the logarithmic function at zero and the singularity of the entropy equation near the vacuum region, the mathematical analyses on the behavior of the entropy near the vacuum region, were rarely carried out; in particular, in the presence of vacuum, it was unknown if the entropy remains its boundedness. It will be shown in this talk that the ideal gases retain their uniform boundedness of the entropy, locally or globally in time, if the vacuum occurs at the far field only and the density decays slowly enough at the far field. Precisely, we consider the Cauchy problem to the full compressible Navier-Stokes equations, with or without heat conductivity, and establish the local and global existence and uniqueness of solutions with uniformly bounded entropy in space at each time slice, in the presence of vacuum at the far field only. These are joint works with Prof .Zhouping Xin. (Received September 10, 2020)