



# 清华大学高等研究院

Institute for Advanced Study, Tsinghua University

## Astrophysics Seminar

- Title:** Planetesimal Formation through the Streaming Instability
- Speaker:** Dr. Chao-Chin Yang  
(Univ. of Nevada, Las Vegas)
- Time:** 4:30pm, Monday, Nov. 18, 2019
- Venue:** Conference Hall 322, Science Building, Tsinghua University

### Abstract

The formation of kilometer-scale planetesimals is one of the most difficult stages in the course of planet formation around young stars. It is faced with several major barriers. Direct dust growth by coagulation is limited, up to mm to cm in size, due to inefficient sticking, bouncing, and fragmentation at collision. Even if the dust grains manage to grow past cm in size, they continually lose angular momentum to their surrounding gas due to constant head wind, leading to rapid orbital decay to the star. One promising mechanism for circumventing these barriers is the streaming instability, in which the solids actively participate in the dust-gas dynamics to concentrate themselves to high density, leading to direct gravitational collapse and the formation of planetesimals.

I will review our current understanding of the streaming instability and planetesimal formation. Specifically, how the instability operates, under what conditions it drives strong concentration of solid materials, the initial mass function of the resulting planetesimals, and its interaction with turbulent gas will be examined.