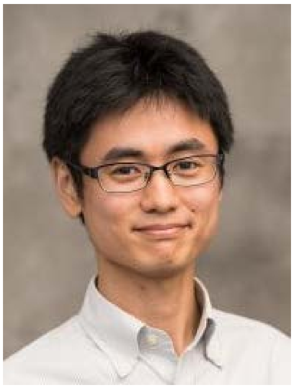
Astrophysics Seminar

Dynamical diagnosis of the Galactic bar with stellar streams



Tuesday

February 14

12:30 P.M.

Rm 184 NSH

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Recent observations have revealed that the outer part of the Milky Way's stellar halo contains many filamentary structures dubbed stellar streams. These streams are thought to be remnants of tidally disrupted dwarf galaxies and globular clusters. The discovery of stellar streams itself is important in modern astronomy, since it supports the hierarchical formation scenario of the Milky Way.

So far, most of the discovered stellar streams have been found in the outer halo. This is not surprising, since the long dynamical time in the outer halo means streams retain their spatial coherence over long timescales. On the other hand, it has been believed that the inner halo should show smooth distribution, as the much shorter dynamical time causes inner-halo streams to rapidly lose their spatial coherence. The recent discovery of the Ophiuchus stellar stream (Bernard et al. 2014), which is located near the bulge region, challenges this picture and sheds new light on the structure and formation history of the stellar halo.

Here I propose a new mechanism that makes a fraction of inner-halo streams retain their spatial coherence for a long time. Specifically, we propose that the Ophiuchus stream retains its coherence because its orbit is in resonance with the Galactic bar's rotation. Our mechanism suggests that (1) there might be more substructures in the inner halo of the Milky Way than previously thought; and that (2) the use of inner halo substructures opens a new possibility of constraining the evolution of the Galactic bar, such as the slow-down of the pattern speed of the bar.