ID de Contribution: **54** Type: **Oral presentation**

Impact of the M31 merger on the timing argument estimate of the Local Group mass

mercredi 9 avril 2025 17:15 (15 minutes)

The timing argument (TA) associates the motion of the Milky Way (MW) and Andromeda Galaxy (M31) to their internal gravity, and aims to find the total mass of the Local Group (LG). However, the classical TA always overestimates the LG mass, presumably because it ignores the hierarchical scenario and other interactions such as that with the Large Magellanic Cloud (LMC). This work focuses on the impact of the recent major merger experienced by M31. We used three models of this merger to account for its impact on the peculiar motion of the M31 within the simple two-body and point-mass system of the TA calculation. We found that the addition of the merger can both increase or decrease the TA mass depending on the tangential motion of M31, which has large uncertainties. Our result agrees with the findings from cosmological simulations, for which TA mass is found to be either higher or lower than the virial mass for LG analogues. If we determine the M31 tangential motion to search for the LG lowest mass, the M31 merger correction alone does not lower enough the TA mass to the level LG mass determined by the Hubble flow perturbation. However, the TA mass is found to be in agreement with the LG mass if both the M31 merger and LMC impact are corrected at the same time. Finally, we find that the TA is limited by the hierarchical scenario, since it becomes increasingly difficult to determine the progenitors of both MW and M31 at the earliest epochs.

Astrophysics Field

Galaxies: Local Group –Galaxies: interactions –Galaxies: evolution

Author: AKIB, Istiak Hossain (Paris Observatory - PSL)

Co-auteurs: HAMMER, Francois; YANG, yanbin (GEPI, Observatoire de Paris)

Orateur: AKIB, Istiak Hossain (Paris Observatory - PSL)

Classification de Session: Session 4

Classification de thématique: Astrophysics