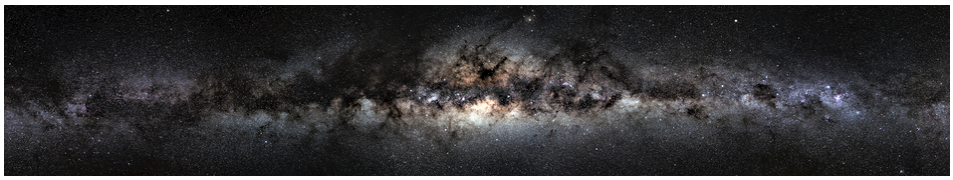

Contribution ID: **58** Type: **Oral**

Seeding Supermassive Black Holes with Self-interacting Dark Matter

Thursday, 9 December 2021 11:20 (18 minutes)

Observations show that supermassive black holes (SMBHs) with a mass of one billion solar mass exist when the universe is just 6% of its current age. We propose a scenario where a self-interacting dark matter halo experiences gravothermal instability and its central region collapses into a seed black hole. The presence of baryons in protogalaxies could significantly accelerate the gravothermal evolution of the halo and shorten collapse timescales. The central halo could dissipate its angular momentum remnant via viscosity induced by the self-interactions. The host halo must be on high tails of density fluctuations, implying that high-z SMBHs are expected to be rare in this scenario. We further derive conditions for triggering general relativistic instability of the collapsed region. Our results indicate that self-interacting dark matter can provide a unified explanation for diverse dark matter distributions in galaxies today and the origin of SMBHs at redshifts around 6-7.

Primary author: ZHONG, Yiming (Kavli Institute for Cosmological Physics)

Presenter: ZHONG, Yiming (Kavli Institute for Cosmological Physics)

Session Classification: Parallel 1: Axions and Other Dark Matter Particles