



University
of Victoria

PHYSICS AND ASTRONOMY SEMINAR (In Person)

Dr Adam Smercina
University of Washington

“The Structure of M33 in Resolved Stellar Populations from the PHATTER Survey”

Abstract

“The Triangulum, M33, is among the nearest undisturbed Magellanic spiral galaxies. Though nearly identical in mass to the LMC, M33 looks quite different, having long been classified as an unbarred, flocculent spiral galaxy. I will present results from the Panchromatic Hubble Andromeda Treasury Triangulum Extended Region (PHATTER) survey, including a first global view of the structure of M33 in resolved stellar populations. We find dramatic differences in the structure of M33 when comparing stars of different ages. Old stars, traced by the RGB and AGB, show a smooth exponential disk with two distinct spiral arms, rather than the flocculent structure often seen in broadband images. The two arms are asymmetric, however, with a strong underlying $m=1$ mode. Counter to previous studies of M33, we find a classically strong bar, with an effective radius of ~ 350 pc. The bar is also clearly visible in intermediate-age core Helium-burning stars and maps of M33's integrated recent star formation history. The youngest stars, in contrast, exhibit the flocculent multi-armed structure with which M33 is typically associated, and a weaker bar. Building on recent findings of a kinematically hot inner halo in M33, we find an underlying broken power-law model consistent with the observed halo fractions. Overall, our results suggest that the visible flocculent structure of M33, shared by other nearby Magellanic spirals, likely tracks the dynamical state of its gas, while the bulk of its stellar mass is ordered in a smooth disk with a classical bar and a double-arm spiral. This discrepancy between the morphology of M33's gas and stars, and the strong asymmetry in its spiral arms, may be indicative of a recent interaction between M33 and M31.”

Wednesday, October 12, 2022

10:00 a.m. PDT

Clearihue A225