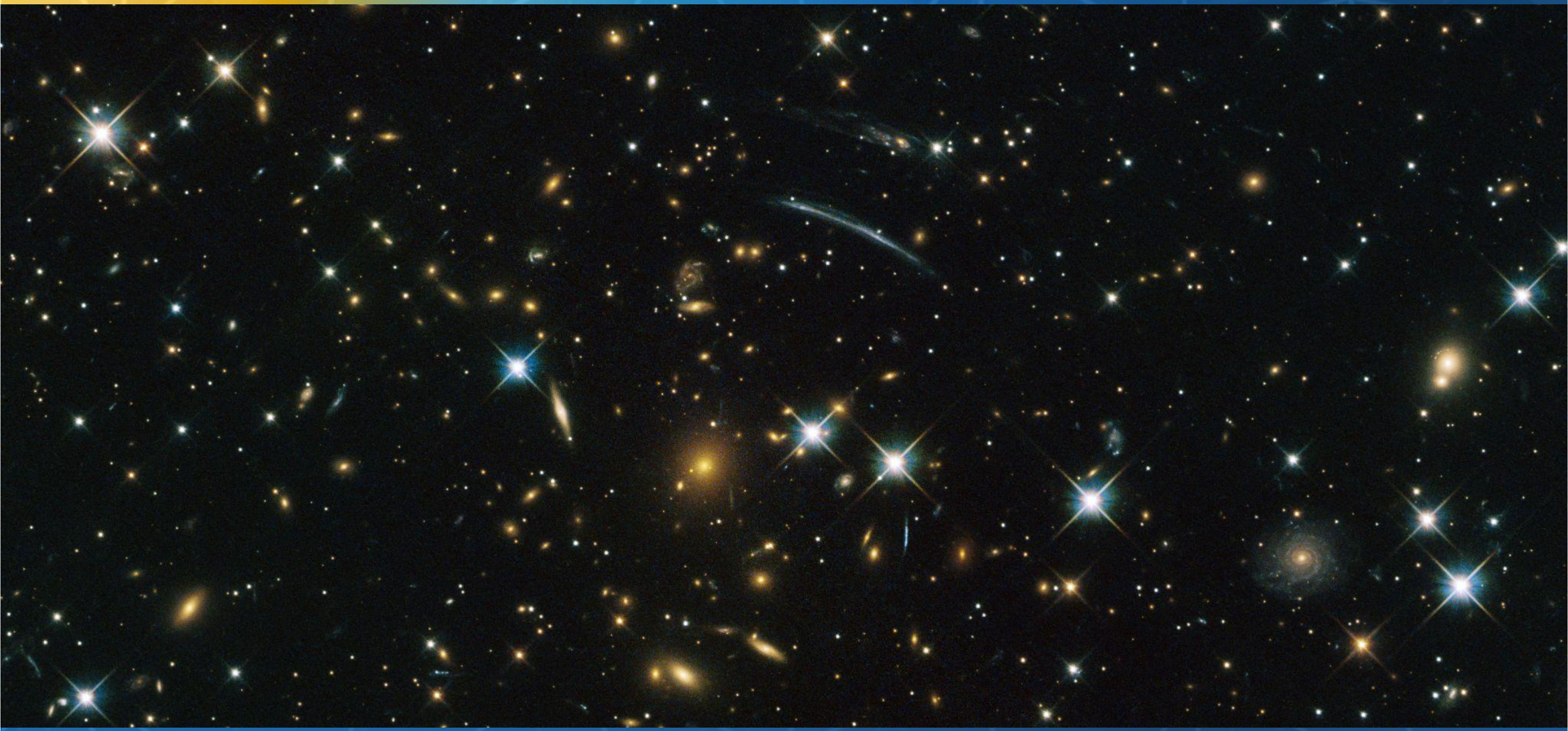
ASTROPHYSICS SEMINAR SERIES

Institut Spatial de McGill
McGill Space Institute

CRAQ
Understanding the Universe



The Rarest Galaxies in the First 2 Billion Years

CAITLIN CASEY | *UNIVERSITY OF TEXAS AT AUSTIN*

The rarest galaxies formed early in the Universe's history pose unique problems for galaxy formation and evolution in a Lambda-CDM universe. I will discuss three separate observational campaigns — with ALMA, Keck, and JWST — aimed at finding and characterizing massive ($M^*>10^{10}$ Msun) galaxies in the Universe's first 2 Gyr, then present lessons learned (or to-be learned) from those discoveries. I will first share results of the Mapping Obscuration to Reionization with ALMA (MORA) Survey, a Cycle 6 ALMA program that has constructed the largest extragalactic ALMA blind-field mosaic in an effort to identify highly obscured star-forming galaxies beyond $z>4$. Such galaxies are the progenitors of the first massive, quiescent galaxies formed at $z>3$. Within MORA, we have measured the contribution of highly obscured galaxies to the cosmic star-formation rate density out to $z\sim6.5$ and found the highest-redshift unlensed dusty star-forming galaxy at $z=5.85$. Second, I will share some of the anticipated results from the upcoming COSMOS-Web Survey, the largest JWST Cycle 1 program which aims at identifying thousands of massive galaxies embedded within the Epoch of Reionization at $6<z<11$. The scale over which COSMOS-Web operates is well matched to the expected scales of ionization bubbles in the intergalactic medium, mitigating the impact of cosmic variance and allowing the first concrete measurement of the contribution of massive galaxies to the reionization process in the Universe's first Gyr. In preparation for the results we anticipate from JWST, I will also share early progress from the Webb Epoch of Reionization Lyman-alpha Survey (WERLS), which is a Key Strategic Mission Support program on Keck LRIS and MOSFIRE spectrographs supported through NASA; the goal of WERLS is to conduct a Lyman-alpha detection experiment towards galaxies already identified within the EoR and use those galaxies to identify the nodes of ionization bubbles. When JWST data arrive, we will then directly compare the locations of ionized bubbles probed by WERLS to the peaks in the galaxy density maps to infer the sources of reionization itself.

19 APR 2022 **3:30 PM EDT** **YouTube Live**