The Evolution of Massive Stars: Closing the Loop in the Local Group

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Massive stars are the “cosmic engines” of the Universe, proving most of the UV ionizing radiation of galaxies, while also powering their far-IR luminosities. And, massive stars serve as the primary source of carbon and oxygen enrichment of the ISM, as well as manufacturing the elements heavier than Fe during their core-collapse deaths as SNe. Population III massive stars likely played a key role in the re-ionization of the Universe, and their black-hole remnants may have formed the seeds of the super-massive black holes found in the centers of many galaxies today. However, the physics of massive star is complicated, and feedback from observations is crucial to advancing stellar evolution modeling. Massive star evolution depends heavily on the metallicity of the gas out of which these stars form owing to the importance of mass loss via their strong stellar winds. Thus we can use the galaxies of the Local Group as our laboratories for closing the loop in our understanding of massive star evolution. In this talk I will discuss how we identify OB stars, Luminous Blue Variables, yellow and red supergiants, and Wolf-Rayet stars, and what we have so far learned from these studies.