

# Department of Physics and Materials Science



## SEMINAR

Coevolution through Coalescence: Studying the Growth of Galaxies and their Black Holes in Mergers

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**Abstract:** Galaxy mergers are key events in the coevolution of galaxies and their supermassive black holes (SMBHs), possibly triggering enhanced star formation (SF) and SMBH growth. It is predicted that host galaxy SF and SMBH growth peaks when the central SMBHs of the merging galaxies are at kiloparsec (kpc) separations. Here, I will review our current understanding of how SMBHs coevolve with their host galaxies in the kpc separation regime of galaxy merger events. As well as work I have done to understand the environments that preferentially trigger dual AGN (both SMBH are active) as compared to offset AGN (only one SMBH is active) during galaxy mergers.

I will then move past the kpc regime of galaxy mergers to examine a second coalescence: the merger of the central black holes. It is theorized that the central black holes of the merging galaxies continue to migrate to the center of the merger remnant, eventually forming a binary pair and merging themselves, releasing gravitational waves (GW) in the process. Unlike the kpc separation regime of galaxy mergers, there is far less known about this process and the interplay the black hole pair and its environment. Using a multimessenger approach that combines GW and electromagnetic observations, we may be able to detect these merger events and study the coevolution of galaxies and their central black holes during this second coalescence. To that end, I will discuss work focused on preparing for multimessenger searches with the upcoming Laser Interferometer Space Antenna (LISA), expected to launch in the next decade.

**Bio:** Dr. Aaron Stemo, is an astrophysicist working at Vanderbilt University as National Science Foundation Mathematical and Physical Sciences Ascending Postdoctoral Research Fellow. He received his PhD from the University of Colorado Boulder in 2021 while working with his advisor Prof. Julie Comerford. Currently, a lot of his research focuses on using large collections of data from multiwavelength surveys to better understand coevolution during galaxy merger events, but he is also interested in incorporating new tools from gravitational wave astronomy (i.e., using multimessenger astronomy) to explore coevolution as well.

## YOU ARE INVITED!

Friday Feb. 24<sup>th</sup>, 3 - 4 PM Manning Hall 201



Driven by doing.