

## **Reduction of optical cavity losses using actively-tunable adaptive optics**

Edita Bytyqi

*Mentors: Jon Richardson, Rana Adhikari, Aidan Brooks*

Optical cavities play an important role in laser interferometer gravitational wave detection. To increase the interferometer's sensitivity, the operating power in the cavities needs to be proportionally increased. Nevertheless, due to point absorbers in the end mirrors, light is scattered into higher order modes limiting the amount of power that can be reached inside a cavity. Here, we propose an adaptive optics approach in reducing optical losses by residual aberration correction using focused heat. We use a spherical reflector and cartridge heater to focus radiant heat to a 1.5 cm spot near the center of the mirror. The reflector radius of curvature does not significantly affect the focus, however the distance of the heater from the mirror and the coating of the reflectors make a paramount difference. We will vary the distance from the mirror and use Aluminum foil and potentially, polished gold, to get as small of a focus as possible. Obtaining a good focus will allow better control in the projected heat pattern and can be used to actuate the coupling of different modes.