



# PHYSICS

## COLORADO STATE UNIVERSITY

### CSU PHYSICS COLLOQUIUM

**Reverberation Mapping of Active Galactic Nuclei**  
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Monday, March 5th at 4:00p.m.  
120 Engineering (Hammond Auditorium)

#### Abstract

Active Galaxies are powered by accreting supermassive black holes in their nuclei. The emitting regions are too small and too small away to spatially resolve, but we can still determine the distances and speeds of gas in these regions that enable us to measure the central black hole masses using a technique called reverberation mapping, also known as echo mapping. Time-domain spectroscopy is employed to determine the response of line-emitting gas to luminosity changes, establishing time delays and hence sizes. Reverberation-mapping campaigns have established a relationship between the luminosity and radius of the line-emitting regions, and moreover found the dynamical signatures of rotation motion, but also infall and outflow as well. More recent campaigns have found deviations from the radius-luminosity relationship, hinting at new astrophysics. Reverberation mapping holds promise to solve one particularly vexing problem, that of binary supermassive black holes — expected to exist but not yet identified — and I describe our current campaign targeting binary black hole candidates at WIRO and show preliminary results.