Accretion is the process by which objects in space, like stars or even whole galaxies, gather material from their surroundings. This project explores how white dwarfs—the dense remnants of stars like our Sun—accrete material from a companion star in two types of systems: symbiotic stars and cataclysmic variables. These systems are not only fascinating but also hold the key to understanding some of the universe's mysteries.

Symbiotic stars are unique pairs where a white dwarf and an aging red giant star interact. The white dwarf accretes the red giant wind, resulting in a variety of dramatic phenomena, such jets ejections. These systems may eventually produce type Ia supernovae—stellar explosions that help astronomers measure the universe’s expansion. However, we still have much to learn about how these pairs evolve and why their behavior doesn’t always match predictions.

Cataclysmic variables are another type of pairing, where the white dwarf accretes material from a smaller star similar to our Sun. These systems are known for sudden, explosive outbursts called novas, which enrich the cosmos with elements crucial for the formation of planets and life. They are also important for the future of gravitational wave astronomy, as their movement creates ripples in the fabric of space-time that advanced detectors may soon observe.

By studying how material flows and how energy is exchanged in these systems, this project aims to solve long-standing mysteries about their behavior and evolution. The findings will not only shed light on these specific star systems but also provide insights into other cosmic phenomena, such as the growth of black holes and the formation of new stars. Ultimately, this research will help us piece together the intricate puzzle of how the universe works, showing the connections between small-scale systems and the grandest events in the cosmos.