Binary Stars

Contrary to the popular belief that most stars are singles, around half of the stars we see in the galaxy are actually found in pairs called binary systems or simply "binaries". Their binary nature can be discovered or inferred in many different ways, such as through eclipses that occur when one star of the pair passes in front of the other, or through the characteristic features and behavior of their combined spectrum. Moreover, binaries play a major role in astrophysics. Stars being born with companions not only is a breakthrough in science, but also for female astronomers. This incredible discovery published by Antonia Maury in 1921, being the first woman to publish a paper in astronomy. They offer scientists an insight into crucial stellar processes as well as enable accurate measurements of fundamental stellar parameters such as mass and radius through the gravitational interaction between the two components of the system.

In recent years, stellar surveys have increased exponentially in complexity and amount of stars observed, and while binaries have been shown to be abundant they are often missed in observational data. The reason for this is that in order to reveal their true nature, binary stars require a special handling besides that given by traditional methods for the analysis of stellar data. This can, in most cases, be quite time consuming. However, new approaches for discovery and characterization of binary stars have been made possible by advances in the field of machine learning and the increase of computational power. Machine learning is the name given to a set of algorithms and statistical tools used by computers to extract information from data by recognizing patterns without being explicitly programmed to do so. With it, it is possible to not only examine and study the large amounts of new data gathered by stellar surveys, but also "revisit" older data-sets in order to extract insights and patterns that were overlooked in the past.

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