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Astronomy in the undergraduate advanced laboratory: Studying delta-Scuti variable stars

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Astrophysics concepts acquired in undergraduate courses are sometimes difficult to explore in a teaching laboratory for upper year physics students. We will share our experience developing an experiment on variable stars offered as part of an undergraduate advanced lab courses at Carleton University. The stars studied were mainly of the delta-Scuti type (Dwarf Cepheid), because of their high amplitude variability and fairly short period. With an amateur level telescope and CCD camera, students collect a sequence of variable star images over the period of a few hours, then process and calibrate the images and extract information related to the star. In addition to the technical aspects of data processing in astronomy, students also learn how differential photometry works, investigate the relationship between the period and the luminosity of the star, calculate the distance of the star and, with photometric filters, study its temperature and radius variations.

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