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Computational Physics II  
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## COMPUTATIONAL PHYSICS PROJECT PROPOSAL

The comet Schwassmann-Wachmann 1 is well known in the community of cometary scientists as a very quirky comet. It frequently experiences outbursts where the brightness of the comet may increase by a factor of 5-100. It is during these outbursts that we can see jets of sublimating gases which seem to radiate from a point source on the surface of the nucleus. By watching how these jets rotate over time scientists hope to understand the rotational behavior of the comet, which at this time is not well understood.

For my undergraduate honors thesis I wrote image processing software that would enhance the faint jet structure of observational images of the sw1, which were taken at Lowell Observatory and the UH-IFA telescope. After the jets were brightened I wrote software that would measure the radial position of the jets. In all I was able to measure the radial position of jets for 5 different observations which lasted approximately a week each. Unfortunately, I ran out of time to work on the project, and I was not able to fully determine the rotational properties of the comet.

For my project I would like to write a program that will simulate the jet structure for the comet sw1 given an input of the rotational properties of the nucleus and using an orbital ephemeris for the comet. The program should also take into account things like radiation pressure which acts on the gas as well as solar illumination effects (i.e. all the different physical effects that would be seen in the observational images of the comet). If there is time this simulation will eventually become a monte carlo simulation for the comets rotational structure which will “scan” through the rotational parameter space. These simulations can be compared with the real observational data in order to determine the rotational properties of the comet.

Unfortunately I don't feel comfortable writing this in C++. I will be writing in a language called the Interactive Data Language (IDL distributed by RSI) which is a language commonly used in astronomy research since it makes itself more available to image processing.