



PHYSICS AND ASTRONOMY SEMINAR

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“The GrayStar Project: Moving computational stellar astrophysics into the Web browser”

Abstract

The goal of the GrayStar project is to turn any WWW browser running on any device into a didactic “teaching and learning” virtual star equipped with user-friendly input parameter knobs and instrumented with virtual observables and more advanced modeling outputs, so that stellar astronomy instructors can use physics education research (PER) methods in class. No special technical specifications are required of the user's device, nor any special computational savviness on the part of the user. GrayStar3 is a physics-based general stellar atmosphere and spectral line modeling code written in JavaScript that displays its output in HTML. It is scientifically credible for pedagogical demonstration purposes, yet it adopts enough simplifying approximations to be almost instantaneously responsive and is suitable for classroom demonstration and lab-style homework projects. The HTML user interface is adaptable to be appropriate for a broad range of pedagogical levels, and there are more advanced physics modules that can be turned on to produce more realistic output and to address topics relevant at the introductory graduate level. GrayStar is publicly discoverable on-line and its accessibility as a WWW “activity” potentially “normalizes” the idea of scientific computational modeling and parameter inference. As JavaScript and HTML become more sophisticated, and as personal computational devices become more powerful, this approach may become increasingly important to the scientific education and research community. The application may be found at www.ap.smu.ca/~ishort/OpenStars/GrayStar3/GrayStarV3.html, and is most reliably responsive in the Chrome and Opera WWW browsers. Users are encouraged to download their own local installation and to modify it.

Time permitting, I will address a recent extension of this idea, GrayStarServer, that performs on-demand spectrum synthesis on a server at Saint Mary's and displays the result in the GrayStar client UI (www.ap.smu.ca/~ishort/OpenStars/GrayStarServer/grayStarServer.html).

Thursday, January 28, 2016

2:30 p.m.

Elliott Building

Room 167