

[Home](#)[Search](#)[Journals](#)[Books](#)[Abstract Databases](#)[My Profile](#)[Alerts](#)[? Help](#)Quick Search: within All Full-text Sources[? Search Tips](#)Brought to you by:
University of Wisconsin[Journal of Quantitative Spectroscopy and Radiative Transfer](#)[Article in Press, Corrected Proof - Note to users](#)doi: [10.1016/j.jqsrt.2005.05.031](https://doi.org/10.1016/j.jqsrt.2005.05.031)[? Cite or Link Using DOI](#)

Copyright © 2005 Elsevier Ltd All rights reserved.

This Document[▶ Abstract](#)**Actions**

- [Cited By](#)
- [Save as Citation Alert](#)
- [E-mail Article](#)
- [Export Citation](#)

HELIOS-CR – A 1-D radiation-magnetohydrodynamics code with inline atomic kinetics modeling

J.J. MacFarlane  , I.E. Golovkin and P.R. Woodruff

Prism Computational Sciences, 455 Science Drive, Suite 140, Madison, WI 53711, USA

Accepted 26 April 2005. Available online 31 May 2005.

Abstract

HELIOS-CR is a user-oriented 1D radiation-magnetohydrodynamics code to simulate the dynamic evolution of laser-produced plasmas and z-pinch plasmas. It includes an in-line collisional-radiative (CR) model for computing non-LTE atomic level populations at each time step of the hydrodynamics simulation. HELIOS-CR has been designed for ease of use, and is well-suited for experimentalists, as well as graduate and undergraduate student researchers. The energy equations employed include models for laser energy deposition, radiation from external sources, and high-current discharges. Radiative transport can be calculated using either a multi-frequency flux-limited diffusion model, or a multi-frequency, multi-angle short characteristics model. HELIOS-CR supports the use of SESAME equation of state (EOS) tables, PROPACEOS EOS/multi-group opacity data tables, and non-LTE plasma properties computed using the inline CR modeling. Time-, space-, and frequency-dependent results from HELIOS-CR calculations are readily displayed with the HydroPLOT graphics tool. In addition, the results of HELIOS simulations can be post-processed using the SPECT3D Imaging and Spectral Analysis Suite to generate images and spectra that can be directly compared with experimental measurements. The HELIOS-CR package runs on Windows, Linux, and Mac OSX platforms, and includes online documentation. We will discuss the major features of HELIOS-CR, and present example results from simulations.

Keywords: Hydrodynamics; Radiation transport; Atomic kinetics; Laser-produced plasmas; Z-pinch plasmas; High energy density physics

 Corresponding author.

Note to users: The section "Articles in Press" contains peer reviewed and accepted articles to be published in this journal. When the final article is assigned to an issue of the journal, the "Article in Press" version will be removed from this section and will appear in the associated journal issue. Please be aware that "Articles in Press" do not have all bibliographic details available yet.

There are two types of "Articles in Press":

- **Uncorrected proofs:** these are articles that are not yet finalized and that will be corrected by the authors. Therefore the text could change before final publication. Uncorrected proofs may be temporarily unavailable for production reasons.
- **Corrected proofs:** these are articles containing the authors' corrections. The content of the article will usually remain unchanged, and possible further corrections are fairly minor. Typically the only difference with the finally published article is that specific issue and page numbers have not yet been assigned.

Journal of Quantitative Spectroscopy and Radiative Transfer

Article in Press, Corrected Proof

This Document

▶ **Abstract**

Actions

- [Cited By](#)
- [Save as Citation Alert](#)
- [E-mail Article](#)
- [Export Citation](#)

[Home](#) [Search](#) [Journals](#) [Books](#) [Abstract Databases](#) [My Profile](#) [Alerts](#)

 [Help](#)

[Contact Us](#) | [Terms & Conditions](#) | [Privacy Policy](#)

Copyright © 2005 [Elsevier B.V.](#) All rights reserved. ScienceDirect® is a registered trademark of Elsevier B.V.