

Author: [ADVANCED](#)Volume Page Keyword: [TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

ONLINE ISSN : 1349-6603

PRINT ISSN : 0387-0200

The Review of Laser Engineering

Vol. 31 (2003) , No. 11 p.711

[\[Image PDF \(2023K\)\]](#) [\[References\]](#)**Potentiality of the Laboratory Astrophysics Using High Repetition Rate and High Intensity Lasers**[Mamiko NISHIUCHI](#)¹⁾, [Hiroyuki DAIDO](#)¹⁾, [Hideaki TAKABE](#)²⁾ and [Koji MATSUKADO](#)³⁾

1) Advanced Photon Research Center, Kansai Research Establishment, Japan Atomic Energy Research Institute

2) Institute of Laser Engineering, Osaka University

3) National Institute of Radiological Sciences

(Received: June 10, 2003)

Abstract: This review article introduces ultra-high intensity laser driven plasmas for laboratory astrophysics which is currently getting popular in the scientific community. Experiments on radiation hydrodynamics in the laser driven gas-jet target is introduced. The result may contribute to the interpretation of the supernova explosion under the radiative cooling condition. A laser created high-density plasma also nicely contributes to the astrophysics. A femto-second laser whose pulse width is less than 100 fs is instantaneously produces a solid density plasma which is sometimes a strongly coupled and Fermi degenerate plasma. Characterization of such a plasma contributes to the interpretation of physical processes of interior of the stars and planets. The laboratory experiments make physical processes themselves clearer with high precision and reproducibility. Another topic includes ultra-high magnetic fields of more than 10 Mgauss (1000 Tesla) which can be commonly found in stars especially in the neutron stars and the white dwarfs. The quantitative estimation of the field strength in stars is not so easy. The laser driven high magnetic field can also contribute to make diagnostics much more accurate. Finally, the authors emphasize that the ultra-high intensity lasers open new aspects of laser-produced plasmas for laboratory astrophysics.

Key Words: [Laboratory astrophysics](#), [Laser driven magnetic field](#), [Radiation](#)

[hydrodynamics](#), [Strongly coupled plasma](#), [Ultra-short and high intensity laser](#), [Femto-second laser](#)

[\[Image PDF \(2023K\)\]](#) [\[References\]](#)

Download Meta of Article [\[Help\]](#)

[RIS](#)

[BibTeX](#)

To cite this article:

Mamiko NISHIUCHI, Hiroyuki DAIDO, Hideaki TAKABE and Koji MATSUKADO: The Review of Laser Engineering, Vol. **31**, (2003) p.711 .

doi:10.2184/laj.31.711

JOI JST.JSTAGE/laj/31.711

Copyright (c) 2006 by The Laser Society of Japan



[Japan Science and Technology Information Aggregator, Electronic](#)

