



Canadian Association
of Physicists

Association canadienne
des physiciens et physiciennes

Contribution ID: 2442

Type: **Invited Speaker** / **Conférencier(ère) invité(e)**

Ultra-broad bandwidth lasers opening up an easier path to laser fusion

Tuesday 4 June 2019 15:45 (30 minutes)

A reasonably complete understanding of laser-plasma instabilities in directly-driven inertial confinement fusion has been gained over the past few years by a combination of advances in theory, model development and experiment. It is seen that, by application of laser bandwidth at the 1% level, prospects of ignition on a MJ-scale facility are much improved. I will describe the physical models that have led to these conclusions and the possibility of testing the results in near future. These tests will involve focused laser-plasma interaction experiments using the ultra-broadband laser program underway at the Laboratory for Laser Energetics (University of Rochester, NY, United States). I will also describe recent work that is exploring the use of structured, orbital angular momentum carrying, laser beams to achieve similar mitigating effects on existing laser facilities that lack a broad bandwidth capability.

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Session Classification: T4-2 Plasmas in Different Regimes: Hot and Cold (DPP) | Plasmas en régimes différents: chauds et froids (DPP)

Track Classification: Symposia Day - Plasma Physics