

Present understanding of ignition and Gain using indirect-drive inertial confinement fusion target designs on the U.S. National Ignition Facility

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For many decades, the running joke in fusion research has been that ‘fusion’ is thirty years away and always will be. Yet, this past few years we find ourselves in a position where we can now talk about the milestones of burning plasmas, fusion ignition, and target energy gain greater than unity (scientific breakeven) in the past tense. Fusion is no longer a joke! Yet getting to fusion ignition, the tipping-point of thermonuclear instability resulting in an explosive increase in ion thermal temperature and fusion reaction-rate, and scientific breakeven (yield > deposited laser energy) has not been easy. In this plenary talk, I will discuss our present understanding of the physics and technological challenges surrounding ignition and Gain as well as highlight some outstanding problems that still need resolution.

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