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Developing an optimal ignition hohlraum for the National Ignition Facility (NIF)[1]

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Over the past two and a half years a multi-disciplinary team of target physicists, laser scientists, laser engineers and target fabricators have been intensively working together in a process to develop the optimal hohlraum for the first NIF ignition experiments to be performed in 2010-11. This multi-disciplinary organization was essential due to the many and diverse trade-offs that must be made. The trade-offs include ignition capsule drive and symmetry requirements, laser plasma interactions, laser performance, target fabrication and shot rate. In a facility as large as NIF, production schedules must also be included in the optimization process. The work of this team has evaluated candidate ignition hohlraums operating at 270, 285 and 300eV. Capsules evaluated include ones with Be and CH ablators. In this talk we will detail the hohlraum+capsule designs and their physics scaling and sensitivities. This includes the required pulse shapes; meeting the implosion symmetry requirement; sensitivity of hohlraum drive and symmetry to spot size; bulk plasma conditions inside these hohlraums and resulting estimates of laser plasma interaction (LPI) risk. These LPI assessments include both gain based estimates as well as more advanced estimates with the wave based code pf3d and it's derivative, SLIP. Finally, we describe the resulting point design that has been chosen for ignition experiments in 2010-11.

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