



Baylor University and CASPER present:

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Low Density Waveguides for Laser Wakefield Acceleration

Abstract: We simulate the possibility of scaling channel formation via inverse Bremsstrahlung (IB) heating to low-Z, low- n_e plasmas using pulses up to 300 ps in duration, as well as generating tenuous plasmas of centimeter to meter lengths using femtosecond optical field ionization (OFI)[1]. Results show IB heating up to tens of eV, and channels formed from an initial density of $1 \times 10^{18} \text{ cm}^{-3}$ with axial densities as low as $1 \times 10^{17} \text{ cm}^{-3}$, and radius of $50 \mu\text{m}$. It has been shown that channel generation via OFI heating can generate waveguides at densities of $\approx 1 \times 10^{17} \text{ cm}^{-3}$ over distances of several centimeters[2]; we will study how channel formation over these distances with an axicon forms from a computational and theoretical perspective. Lastly, we will outline the experimental setup to be used in future experiments at the U. Texas Tabletop Terawatt (UT3) facility.

References

- [1] N. Lemos *et al.*, *Phys Plasmas*, vol. 20, p. 103109, 2013.
- [2] R. Shalloo *et al.*, *Phys Rev E*, vol. 97, p. 053203, 2018.

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Baylor Sciences Building (BSB) C.206

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