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## Multispecies Targets for Spectral Control in Laser-Ion Acceleration

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Laser-accelerated ions typically feature an exponential energy spectrum with a characteristic cut-off energy, a signature of target normal sheath acceleration (TNSA) [1]. However, the broad energy distribution inherent to TNSA poses a significant limitation for applications demanding well-defined ion energies, such as proton therapy [2] and the fast ignition concept in inertial confinement fusion [3].

By introducing multiple ion species into the target material, modulations in the TNSA-driven ion spectrum can be achieved. During the acceleration, the differing charge-to-mass ratios of these species lead to a separation in space and energy [4]. This allows for enhanced control over the ion energy spectrum and particle number.

In my talk, I will introduce the concept of laser-ion acceleration using multi-species targets, discuss the potential advantages of such target compositions based on results from multidimensional particle-in-cell (PIC) simulations, and outline planned experiments to further investigate this approach.

[1] P. Mora, Phys. Rev. Lett. 90, 185002 (2003).

[2] V. Malka et al., Med. Phys., 31: 1587-1592 (2004).

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[4] V.T. Tikhonchuk et al., Plasma Phys. Control. Fusion 47 B869–B877 (2005).

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