Contribution ID: **65** Type: **Contributed Oral**

A scheme for generation and measurement of spin polarized GeV electrons from a PWFA

Monday, 7 November 2022 15:48 (18 minutes)

The generation and acceleration of an electron beam with a high degree of spin polarization is desirable for future plasma-based high-energy colliders. Our recent theoretical and simulations work [1,2] has shown that spin polarized electrons can be produced from photoionization of 4f14 electrons of Yb III ions by a circularly polarized laser, and then accelerated to multi-GeV energies while maintaining their spin polarization in a beam-driven plasma wakefield accelerator (PWFA). An experimental realization of this scheme would require a method of measuring the spin polarization of the accelerated electrons. In our proposed scheme, Møller scattering polarimetry is used to measure the spin polarization of the beam, which involves scattering the beam off of a magnetized target and observing the yield of scattered electrons at specific angles. Measuring the spin polarization of a beam produced from a PWFA presents additional challenges due to the unpolarised drive beam that typically contains nC of charge and a lack of stability from shot to shot. Our spectrometer design addresses these challenges and provides a scheme for both producing and detecting high-energy spin polarized electrons accelerated in a beam-driven plasma-based accelerator.

References:
[1] Z. Nie, et. al., Phys. Rev. Lett. 126, 054801 (2021).
[2] Z. Nie, et. al., arXiv:2206.09017.

Acknowledgments

DOE Award No. DESC0010064,
DOE SciDAC through FNAL Subcontract No. 644405, NSF grants No. 1734315, No. 1806046 and No. 2108970, the Office of Naval Research (ONR) Multidisciplinary University Research Initiative (MURI) (4-442521-JC-22891) and National Natural Science Foundation of China, Grant No. 12075030.

Primary authors: NAMBU, Nainoa (UCLA); NIE, Zan (UCLA); Dr LI, Fei (UCLA); Dr MORALES, Felipe (Max Born Institute); Dr PATCHKOVSKII, Serguei (Max Born Institute); Prof. SMIRNOVA, Olga (Max Born Institute); Dr AN, Weiming (Beijing Normal University); ZHANG, Chaojie (UCLA); WU, Yipeng (UCLA); MATTEO, Daniel (UCLA); MARSH, Kenneth (UCLA); Prof. TSUNG, Frank (UCLA); Prof. MORI, Warren (UCLA); Prof. JOSHI, Chandrashekhar J. (University of California Los Angeles)

Presenter: NAMBU, Nainoa (UCLA)

Session Classification: WGs 4+5 Joint Session

Track Classification: Working Group Parallel Sessions: WG4 Oral: Beam-Driven Acceleration