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Strong energy enhancement in a laser-driven magnetic filament through stochastic radiation friction[1] ALEXEY AREFIEV, UCSD, ZHENG GONG, UT, FELIX MACKENROTH, Max Planck Institute, Dresden, Germany — It has been previously shown that a high intensity laser pulse can propagate through a classically overdense plasma while generating a magnetic filament with a strong quasi-static azimuthal magnetic field [PRL116, 185003]. This azimuthal magnetic field can significantly enhance the energy gain by laser-accelerated electrons, but this requires a sufficiently strong longitudinal plasma current [arXiv:1811.00425]. One might expect that the inclusion of the radiation friction at higher intensities would make the restriction on the current even more severe. Counterintuitively, the radiation friction allows the electrons to enter an otherwise inaccessible regime of acceleration. As a result of the radiation friction, the energy of the laser-accelerated electrons is enhanced by orders of magnitude, as the laser generates a well-collimated beam of energetic electrons and gamma-rays [arXiv:1905.02152]. Our results suggest that this effect could be accessible at next-generation laser facilities.

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