

# XXIV International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS16)



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## Physics case of the very high energy electron-proton collider

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The possibility of using plasma wakefield acceleration to build an electron-proton collider (VHEeP) at a centre-of-mass energy of 9 TeV was presented at the DIS2015 workshop. In this talk, the physics case is further developed, with more detailed studies at low parton momentum fractions,  $x$ , down to  $10^{-8}$ . The VHEeP collider also has sensitivity to the production of leptoquarks approaching the kinematic limit and thus extends the reach currently accessible. Other exotic physics such as a quark sensitivity can also be probed at higher energies or smaller distances. These and other studies are presented, demonstrating that an ep collider with an energy a factor of 30 above HERA has sensitivity to new physical phenomena.

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