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The Oslo plasma lens at the CERN electron test accelerator

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In particle accelerators, magnetic lenses are used to steer, focus, and control the beam. Typically, these are quadrupole magnets which means that the current must be off-center relative to the beam. Because of this, quadrupole magnets are used for focusing, which must defocus one plane (e.g. vertical) in order to focus the other plane (e.g. horizontal). This complicates optics design and performance.

By using plasma as the conductor, this challenge can be side-stepped. An active plasma focusing lens allows the beam to pass through the conductor, with the current parallel to the beam. This makes it possible to design compact and strong lenses focusing in both planes simultaneously.

This talk will present the design, operation, application, and challenges of using active plasma lenses for charged particle beams in the light of the plasma lens experiments at CLEAR, which are led by the High Energy Physics group at Oslo.

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