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Diagnostic considerations for the Plasma Wakefield Acceleration experiment proposed at PITZ

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The proposed experiment is to set up a plasma oven in the Photo Injector Test Facility at DESY, Zeuthen Site (PITZ), beam line to study the self-modulation of electron beams when they passes through a laser generated Lithium (Li) plasma. In the experiment an oven will vaporize Li which will be ionized with a laser pulse, creating plasma with density of 〖10〗 ^15 〖cm〗 ^(-3).
To gain insight into the experimental conditions it is necessary to measure the plasma density. Several methods of absorption spectroscopy and laser interferometry have been proposed in the literature for neutral and plasma density measurements of Li in a plasma oven [1]. Here we are presenting a comparison of plasma density measurement methods which are candidates to be realized in the PITZ PWA experiment.

[1] "Photo-ionized lithium source for plasma accelerator applications", P.Muggli et. al. IEEE Transactions on Plasma Science, Vol. 27, No. 3, June 1999.

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