

**A NEW TECHNIQUE TO MEASURE
THE NEUTRALIZER CELL GAS LINE DENSITY
APPLIED TO A DIII-D NEUTRAL BEAMLINE***

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The DIII-D tokamak employs eight ion sources for plasma heating. In order to obtain the maximum neutralization of energetic ions (providing maximum neutral beam power) and reduce the heat load on beamline internal components caused by residual energetic ions, sufficient neutral gas must be injected into the beamline neutralizer cell. The neutral gas flow rate must be optimized since excessive gas will increase power losses due to neutral beam scattering and reionization. It is important, therefore, to be able to determine the neutralizer cell gas line density. A new technique which uses the ion source suppressor grid current to obtain the neutralizer cell gas line density has been developed. The technique uses the fact that slow ions produced by beam-gas interactions in the neutralizer cell during beam extraction are attracted to the negative potential applied to the suppressor grid, inducing current flow in the grid. By removing the dependence on beam energy and beam current a normalized suppressor grid current function can be formed which is dependent only on the gas line density. With this technique it is possible to infer the gas line density on a shot by shot basis.

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