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Status of a new 28 GHz CW gasdynamic ECR ion source development at IAP RAS

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A new type of ECR ion sources – a gasdynamic ECR ion source was invented recently at the Institute of Applied Physics (IAP RAS, Nizhniy Novgorod, Russia). The main advantages of such devices are extremely high ion beam current with a current density up to $600-700 \text{ mA/cm}^2$ in combination with low emittance i.e. normalized RMS emittance below $0.1 \pi \cdot \text{mm} \cdot \text{mrad}$. The main part of previous experiments were carried out in a pulsed operation mode. Preliminary studies of plasma parameters were performed using a CW source with 24 GHz/5 kW gyrotron heating. Obtained experimental results have demonstrated that all gasdynamic source advantages could be realized in CW operation. To continue development of a CW gasdynamic ion source a new experimental facility is under construction at the IAP RAS. Future source will utilize 28 GHz/10 kW gyrotron radiation for plasma heating. A fully permanent magnet system with magnetic field configuration close to simple mirror trap will be used for plasma confinement. Microwave radiation will be delivered from the gyrotron to a plasma chamber through a quasi-optical line equipped with 100 kV DC-break. Up to 100 kV extraction will be used for intense beams formation. Status of the new source development will be presented.

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