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Room temperature vacuum chamber with cryogenic installations

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The FAIR complex at the GSI Helmholtzzentrum will generate heavy ion beams of ultimate intensities. To achieve this goal, low charge states have to be used. However, the probability for charge exchange in collisions with residual gas particles of such ions is much higher than for higher charge states. In order to lower the residual gas density to extreme high vacuum conditions, 65% of the circumference of SIS18 have already been coated with NEG, which provides a high and distributed pumping speed. Nevertheless, nobel and nobel-like components, which have very high ionization cross sections, do not get pumped by this coating. A cryogenic environment at moderate temperatures, i.e. at 50-80 K, provides a high pumping speed for all heavy residual gas particles. The only typical residual gas particle that cannot be pumped at this temperature is hydrogen. With an additional NEG coating the pumping will be optimized for all residual gas particles. The installation of cryogenic surfaces in the existing room temperature synchrotron SIS18 at GSI has been investigated. Measurements on a prototype chamber and simulations of SIS18 with cryogenic surfaces based on these measurements are presented.

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Footnotes

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