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The effect of small bends in thin non-evaporable getter coated tubes on the partial pressure ratio as a function of sticking probability

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Non-evaporable getter (NEG) coated vacuum chambers are widely used as a vacuum solution in modern particle accelerators.

In the development and testing of new NEG coatings to produce better vacuum, the pumping properties are evaluated.

In this paper, Test Particle Monte-Carlo Simulations are created to investigate whether small bends in sample tubes may affect the results of pumping speed measurements, and therefore lead to a set of inaccurate results. With the preference to move towards smaller beam emittance in new accelerators, the required aperture of the beam vacuum chamber is getting smaller as well. The chambers are thus becoming more delicate (less mechanically stable), and able to be bent, therefore creating the risk that when NEG-coated samples are created, a bend in the tube is skewing the results.

Findings have shown that a bend of less than 1° could lead to a change in results by a factor of 10 in a sticking probability, which is a severe difference that cannot be ignored. The results have a strong correlation with the molecular beaming area from the bottom to the top of the modelled tubes.

In future, it will be important to define how straight a tube must be to obtain accurate pumping property measurements.

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Footnotes

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Yes

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