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Investigations by simulation for ionization type gauges suitable as vacuum transfer standard

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The EURAMET EMPIR project "16NRM5-ion gauge"aims to develop a standardised ionization gauge that is suitable as a transfer standard. In such a gauge the electron trajectories, kinetic energy and current inside the ionization volume needs to be well defined and stable. In the search for a most suitable design, CERN, amongst the other consortium partners, carried out a series of simulation on different ionization gauge concepts that have the potential to meet the stringent requirements. Parameters, such as ion gauge sensitivities, ion collection efficiency and electron transmission efficiency have been simulated as a function of emission current, pressure, electron source alignment and potential. The possibility of suppressing ESD electrons and protecting the ion collector from direct X-rays from the electron impinging area have also been addressed. In ionization gauges space charge may be an important limitation that need to be considered. The simulations have been carried out using the Vector Fields Opera software. Within this software the Scala analysing module is specialised in charged particle trajectories and solving space charge problems.

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