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Search for electron EDM in laser-cooled francium factory

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The electric dipole moment (EDM) of an electron that implies the violation of the time-reversal symmetry has been searched from a half century ago. Francium (Fr) is one of the most promising candidates that could lead to observe a significant EDM because the electron EDM would be enhanced by being bounded in a heavier atom. Therefore, a factory of laser-cooled Fr atoms is being constructed currently at the Cyclotron and Radioisotope Center, Tohoku University. Our factory has achieved the production of high quality Fr ions – the extraction efficiency is around 40% and the extraction yield is about 10^6 pps. It is planning to trap Fr atoms using laser after neutralizing ions to measure the EDM of Fr precisely. Currently, the neutralization and magneto-optical trap using rubidium whose chemical property is similar to one of Fr have been developed. At the conference, we will show the whole of our research plan and report the current status of the development.

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