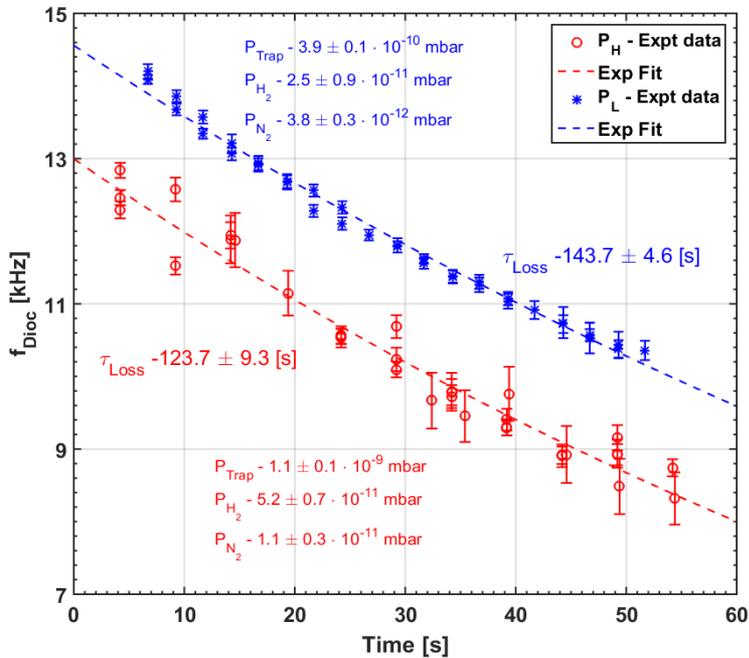


# Unprecedented confinement time of electron plasmas with a purely toroidal magnetic field in SMARTEx-C

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Pure electron plasmas are of great interest for two reasons. Firstly, they can serve as test beds for many open issues in fundamental physics like compressible fluid-dynamics. Secondly, Ion Traps, which can be prepared using similar techniques, are a potential candidate for developing ion trap-based quantum computing. Over the past few decades, IPR has made major contributions in the field of pure electron plasmas confined inside a magnetic “cage” in a toroidal geometry. Recently, the SMARTEx-C experiment in IPR has reported the highest confinement time of pure electron plasma ever reported in the world, viz., exceeding 100 seconds. This was achieved via three major improvements – applying a steady-state B-field of 200 Gauss, an UHV better than  $5.0 \times 10^{-10}$  mbar, and a symmetric arrangement of trap components.

Observed diocotron mode frequency on capacitive probe along with exponential fit for different pressures at 200 Gauss B-field and injection energy of 100V.