

Beam lifetimes for low-charge-state heavy ions in the GSI storage rings

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Abstract

Lifetimes for 10–50 MeV/u U^{28+} ions were measured for base vacuum conditions in the ESR storage ring at GSI-Darmstadt. The lifetimes are due to total electron loss from U^{28+} resulting from interactions with background gases in the ring. Lifetimes were also measured for interactions with H_2 and N_2 targets. These data provide information about the relative magnitudes and energy dependences of the stripping cross-sections resulting from interactions with H_2 and N_2 , gases which represent the primary constituents in high and ultrahigh vacuum environments.

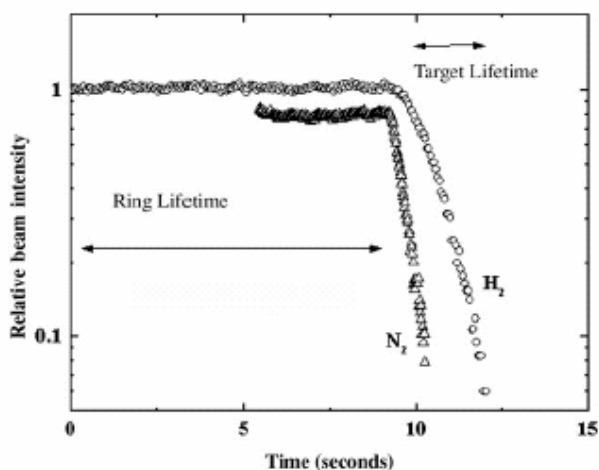


Fig. 1. Background subtracted beam intensity decay curves measured for interactions with background gases in the ESR storage ring and for interactions with the H_2 gas target. The double ended arrows show where the interactions are dominated by ring and target gases.

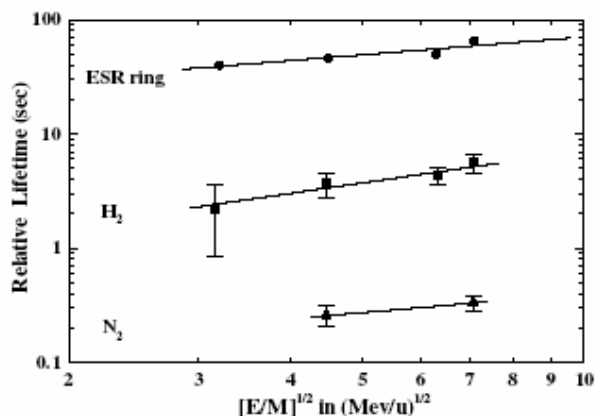


Fig. 2. Lifetimes measured for U^{28+} ions interacting with background gases in the ESR ring and with H_2 and N_2 gas targets. The gas target data are normalized to line densities of $1 \times 10^{13} \text{ cm}^{-2}$ while the ring data are obtained for base vacuum conditions of $2 \times 10^{-11} \text{ mbar}$. The solid lines are fits to the data. See text for details.