GSI

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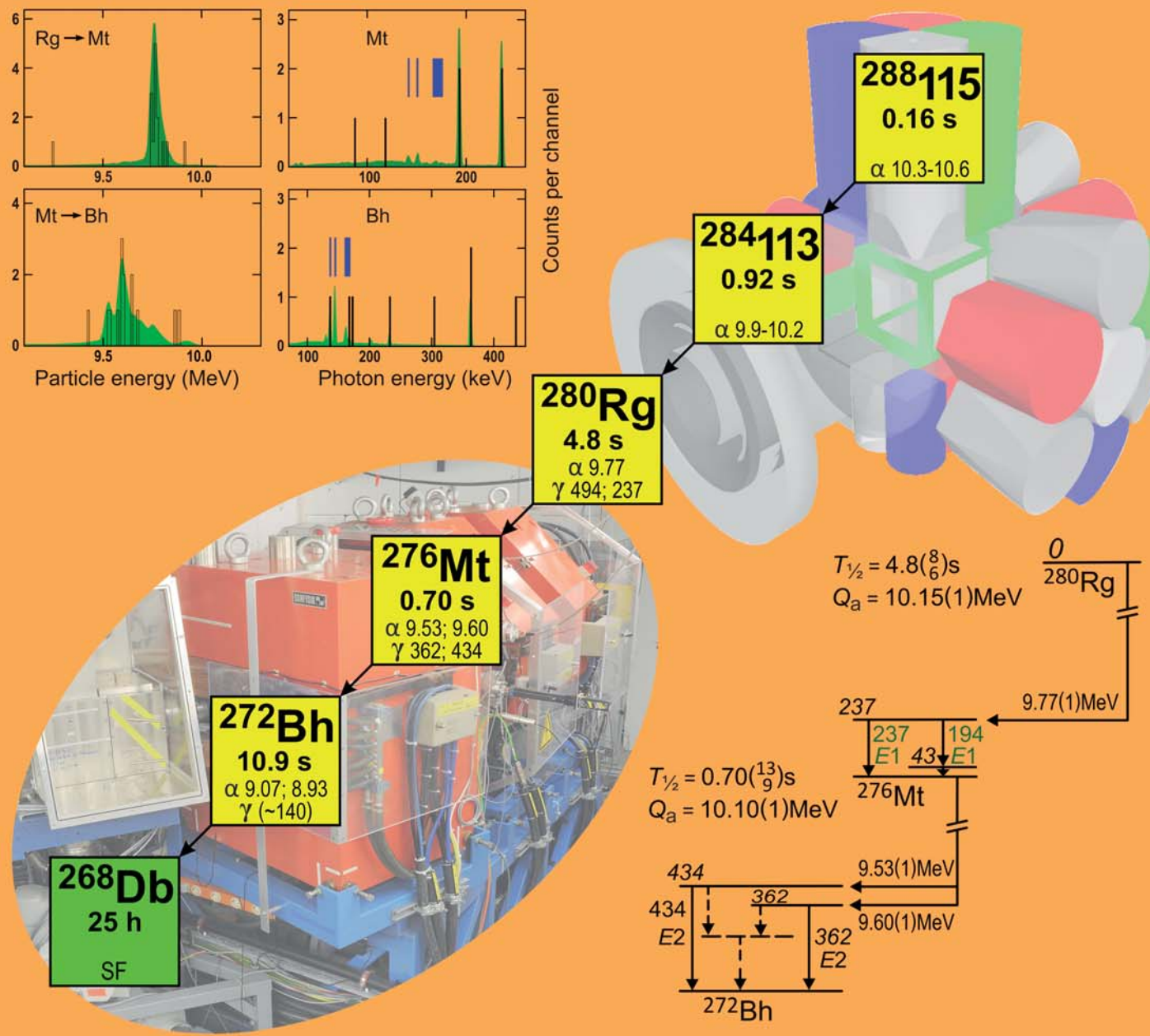

GSI Helmholtzzentrum für Schwerionenforschung GmbH
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The cover shows the set-up and the key results of the element $Z = 115$ experiment conducted at GSI's gas-filled recoil separator TASCA. The α-photon coincidence spectroscopy set-up TASISpec consists of a box of pixelated Si-detectors with surrounding composite Ge-detectors (schematic representation top right). This setup allows detecting superheavy nuclei via their implantation and subsequent nuclear decay and their direct identification by measuring characteristic X rays.
For the experiment an intense ^{48}Ca beam provided by the UNILAC accelerator impinged on a radioactive ^{243}Am target wheel placed at the entrance to TASCA (photo bottom left). 30 correlated α-decay chains, assigned to element 115, were registered in TASISpec within three weeks. Twenty-two of them originated from the isotope with mass number 288 (average values given in the displayed chain at the diagonal). Observed α-photon coincidences (black histograms, upper left) include two K X-ray candidates along the decay chain, the energies of which are compatible with the assignment of the chains to element $Z = 115$. Further coincidences led for the first time to detailed decay schemes (lower right) of superheavy elements near the predicted 'Island of Stability'. The $E1$ γ rays in ^{276}Mt give rise to significant constraints on nuclear structure models. A complex, but in parts still tentative, decay scheme of ^{272}Bh can explain the emission of the two K X-ray candidates. Detailed GEANT4 Monte-Carlo simulations (see TASISpec scheme, top right) were employed for the first time in an experiment on such superheavy nuclei. They allow for a crucial self-consistency check of the interpretation (decay schemes, bottom right) of the measured data (spectra, green curves, top left).
This experiment was selected by the American Physics Society as one of the top ten 'Physics Newsmakers of the Year 2013'.

Cover design: B. Schausten, TASCA photograph G. Otto.