A revolutionary 'nuclear battery' a step closer

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(Phys.org) —Experts in nuclear physics at the University of Surrey have helped develop research towards a 'nuclear battery', which could revolutionize the concept of portable power by packing in up to a million times more energy compared to a conventional battery.

By capturing charged particles in a special storage ring the experts have solved a long-standing problem of how to understand the fundamental structure of an unstable isotope of bismuth, Bi-212, with potential far-reaching consequences.

Professor Phil Walker, of the University's Department of Physics, said: "The new understanding gives us confidence in the nuclear theory, which guides us to the next step of experimentation. It is hoped that this may, in the longer term, lead to the ability to control a form of trapped nuclear energy, with the ability to release the energy on demand."

Catching the bismuth ions in a storage ring has enabled, for the first time, direct observation of the trapped energy state, resolving a previous inconsistency with theory. Now, the theory can be used reliably to predict other properties of this isotope, and this suggests possible ways to release the trapped energy – which would be a key to unlocking the 'nuclear battery' concept.

Working at the GSI accelerator laboratory in Darmstadt, Germany, an international team of scientists has studied a long-lived excited state, or energy trap, associated with the isotope Bi-212.

The bismuth ions were created by high-energy nuclear collisions and focussed into the GSI storage ring, where individual ions were observed as they circulated for several minutes at a time. This capability – observing individual charged atoms over extended periods of time – is world-wide unique to the GSI storage ring, and is opening up a range of scientific investigations into the fundamental properties of matter.

For the full publication see the journal, *Physical Review Letters*: nuclear-physics"
target="_blank">prl.aps.org/toc/PRL/v110/i12#letters-nuclear-physics

Provided by University of Surrey