leased the results of their follow-up RDK II experiment: They've cut their uncertainty in half, extended their energy limits down to 0.4 keV and up to the full 782 keV, and made the first precision measurements of the shape of the radiative decay spectrum.[3]

The aim of the original RDK was to test whether radiative decay could be seen at all, so the researchers could disregard many experimental subtleties. For example, the response of the scintillators in the photon detectors isn't precisely proportional to the incoming photon energy, and the charged particles produced in the decay are sometimes deflected away from the particle detector. Because RDK II no longer had the luxury of ignoring those effects, much of the intervening decade was taken up with auxiliary studies of the detectors' energy response and detailed Monte Carlo simulations (spearheaded by team member Matthew Bales, now a postdoc at the Technical University of Munich) of every aspect of the experiment.

The spectrum the researchers ultimately derived was fully consistent with theoretical predictions. Indeed, it would have been astonishing if it hadn't been. Electron inner bremsstrahlung is governed by quantum electrodynamics (QED), a well-understood theory that's been thoroughly tested, though never before in this particular way.

But QED treats the proton and neutron as point particles rather than as composite particles made up of quarks. Chiral perturbation theory predicts that the nucleons' internal structure and nonzero size should alter the radiative decay spectrum by about 1%. If RDK's accuracy can be increased by a further factor of five, the experiment should be sensitive to those effects.

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References

1. M. Beck et al., *JETP Lett.* **76**, 332 (2002).
2. J. S. Nico et al., *Nature* **444**, 1059 (2006).
3. M. J. Bales et al., *Phys. Rev. Lett.* **116**, 242501 (2016).

round grains, or chondrules. Over the past two decades, Birger Schmitz at Lund University in Sweden and his colleagues have assembled evidence that a subset of ordinary chondrites, known as L chondrites, are pieces of a single large asteroid that was shattered in a collision about 470 million years ago.

Now Schmitz and his team have conducted a detailed analysis of a peculiar meteorite that has the age of an L chondrite but not the composition. Österplana 065 (pictured here) was discovered in 2011 at the Thorsberg quarry in southern Sweden, where workers for a company that produces limestone floors have uncovered more than 100 L chondrites in ancient sediment. Compared with the L chondrites, Öst 65 contains far less oxygen-17 than it should based on its concentration of chromium-54; the ratio of the two isotopes is used to classify meteorites. The quirky space rock also lacks certain minerals and the chondrule texture that distinguish chondrites.

The researchers argue that the discovery of this one anomalous specimen out of the more than 52 000 meteorites classified worldwide has major implications. Schmitz and his colleagues propose that Öst 65 is the first evidence of an extinct meteorite, which no longer falls to Earth yet is representative of the kinds of rocks that exist elsewhere in the solar system. The researchers go further and suggest, based on the meteorite's age, that Öst 65 is a fragment of the object that slammed into the parent body of the L chondrites. (B. Schmitz et al., *Nat. Comm.* **7**, 11851, 2016.) —AG

PHOTONIC QUANTUM HALL EFFECT

Because photons, unlike electrons, have no charge, they don't couple to applied magnetic fields. Yet it's possible to make them behave as if they do—the key is to manipulate the photons' quantum mechanical phase. (See the Quick Study by Mohammed Hafezi and Jake Taylor, PHYSICS TODAY, May 2014, page 68.) One way to do that is to use an orderly arrangement of discrete optical resonators to synthesize an artificial magnetic field. Now Jonathan Simon and colleagues at the University of Chicago have demonstrated a new, lattice-free approach. The researchers exploit a powerful analogy: Quantum mechanically, photons bouncing back and forth between curved mirrors exhibit the same transverse behavior as massive particles in a two-dimensional harmonic oscillator. Routing the light using four mirrors instead of just two, the team made its path nonplanar. That caused photons to pick up an additional phase proportional to their angular momentum, just as if they were charged particles in a magnetic field. Through careful tuning of the resonator's 78 mm optical path, the researchers induced photons from a 780 nm laser into an integer quantum Hall state. The Chicago team further engineered their resonator to induce the photons to behave as if constrained to the surface of a cone, and provided the first experimental validation of a 1992 theory describing the response of quantum Hall particle density to spatial curvature. The researchers expect the approach to allow further exploration of the interplay between geometry and topology and to lead to the creation of photonic fractional quantum Hall fluids. (N. Schine et al., *Nature* **534**, 671, 2016.) —RJF PT