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A renaming proposal: “The Auger–Meitner effect” FREE

Demetrios Matsakis; Anthea Coster; Brenda Laster; Ruth Sime

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LISE MEITNER (left) talking with student Susan Jones Swisher and faculty member Rosalie Hoyt at Bryn Mawr College, April 1959. (Photo by Heka Davis, courtesy of AIP Emilio Segrè Visual Archives, PHYSICS TODAY Collection.)

We are writing to propose that the Auger effect be renamed the Auger–Meitner effect to recognize Lise Meitner's contribution to it. Meitner is better known for her work on nuclear fission, for which she was nominated for the Nobel Prize more than 30 times (reference 1; see also the article "A Nobel tale of postwar injustice," by Elisabeth Crawford, Ruth Lewin Sime, and Mark Walker, PHYSICS TODAY, September 1997, page 26). However, she is less widely recognized for her discovery of what has since become known as the Auger effect and her subsequent publications on the topic[2] in 1922 and 1923.

When an electron from an atom's inner shell is ejected—for example, by UV radiation or nuclear beta decay—an electron from a higher energy level will drop into the vacancy and emit a photon or eject another electron. A cascade develops as other electrons change their state by falling into the energy levels abandoned by the earlier ones. According to Meitner's 1922 description, "a primary (nuclear) β-ray transforms itself in the nucleus into a γ-ray. The γ-ray either goes through unchanged as a γ-ray, or it ejects secondary β-rays from the electron shells. In this way the characteristic x-ray spectrum of the atom is excited, which itself can of course also eject electrons from lower energy levels."[2]

Again, in 1923 Meitner wrote that "the primary β-rays eject outer electrons from the daughter atom, which excites the Kα radiation, which in turn ejects *L*-, *M*- or *N*-electrons from the same atom."[2] She also pointed to the possibility that radiationless transitions could account for the ejection of orbital electrons during beta decay.

The significance of Meitner's discovery was not immediately realized, undoubtedly because she did not emphasize it in her publications; she instead focused on the emission energies of the original beta decay, which due to the simultaneous emission of the then-unknown neutrino resulted in a puzzling energy distribution.

In 1923, a year after Meitner first described the effect, Pierre Auger's cloud-chamber work allowed him to independently observe the cascade that now bears his name.[3] There followed a lively correspondence involving Meitner; Auger; theorists Niels Bohr, Oskar Klein, and Svein Rosseland (who had raised the possibility of radiationless transitions in 1921); and others.[4] The Auger effect remains an area of active research, and Auger, a truly great scientist in many ways, went on to do wonderful things in astronomy. Among his many honors were adoption of the related terminology "Auger electrons" and "Auger peaks," and naming of the Pierre Auger Obser-

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vatory in Argentina, which observes high-energy cosmic rays with “Auger showers.”

Crediting Meitner for being the first to observe the effect has been discussed for at least 30 years. Science writer Richard Sietmann states that “Meitner was the person who really should have taken credit for the so-called ‘Auger’ effect,” although he also suggests that shared credit would be acceptable.[5] In another review, Olivier Duparc writes, “While L. Meitner should have shared the Nobel Prize with [Otto] Hahn, the Auger effect has rightly been attributed to Auger.”[5] We think there is a strong enough claim to honor both contributors.

Such renaming has precedent. In astronomy, for example, according to a private communication last year between David DeVorkin of the Smithsonian’s National Air and Space Museum and one of us (Matsakis), the Hertzsprung–Russell diagram was originally called the Russell diagram. And in October 2018, a resolution to rename the Hubble law as the Hubble–Lemaître law was approved by 78% of the International Astronomical Union’s voting membership.

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Demetrios Matsakis
(dnmyiasou@yahoo.com)
Masterclock, Inc
Washington, DC

Anthea Coster
Massachusetts Institute of Technology
Haystack Observatory
Westford

Brenda Laster
Ben-Gurion University
Beer Sheba, Israel

Ruth Sime
Sacramento City College
Sacramento, California

Iran’s actions threaten Iranian scientists

The Physics Today news story “Iranian scientists persevere under renewed sanctions” by Toni Feder (January 2019, page 22) blames the US embargo for hardships that Iranian scientists encounter as they pursue international collaborations. Only two sentences in the four-page report mention Iran’s recent actions against numerous scientists in the country who have Western connections, and no mention is made of the long prison terms or death sentences they have received “for collaborating with a hostile government.”

Omid Kokabee, a physics doctoral student at the University of Texas at Austin, was sentenced to 10 years on a “collaboration” charge and spent 2011–16 in an Iranian prison; he was released only after he developed kidney cancer (see “Physicist imprisoned in Iran is granted medical furlough after surgery,” Physics Today online, 25 May 2016). Ahmadreza Djalali, a Swedish resident and a principal investigator on two European research projects in disaster medicine, was arrested in 2016 after he was invited to a scientific workshop in Tehran. In 2017 he was sentenced to death for his refusal to spy for Iran’s military.[1]

Xiyue Wang, a doctoral student in history at Princeton University, was sentenced in 2017 to 10 years in prison when his studies of ancient documents in Tehran were interpreted as espionage.[2] Meimanat Hosseini-Chavoshi, an Australian citizen and fertility expert, was detained on her research trip to Iran last December on charges of trying to “infiltrate” Iranian institutions.[3]

In 2018 several Iranian environmental scientists were rounded up on suspicion that their studies of wildlife might have revealed information about Iranian military sites. One of them, Kavous Seyed-Emami, a Canadian citizen and professor at Imam Sadiq University in Tehran, died in prison after intense interrogations.[4] Four others have been accused of “sowing corruption on Earth,” a charge that can carry a death sentence.