

OBITUARIES

Ann Elizabeth Nelson

On 4 August 2019, the theoretical-physics community lost a giant: our supervisor, collaborator, mentor, and role model, Ann Elizabeth Nelson. We remember Ann as a remarkable physicist who pioneered models for the physical phenomena that cannot be explained by the standard model of particle physics. She was also an unequivocal advocate for diversity and inclusivity in the theoretical-physics community.

Ann was born in Baton Rouge, Louisiana, on 29 April 1958. With an undergraduate physics degree from Stanford University, she started her prolific career under the supervision of Howard Georgi at Harvard University in 1980. There Ann became fascinated with questions she would study throughout her career: What is the difference between matter and antimatter, and why is there more of the first? Since matter and antimatter mutually destruct, their respective abundances in our observable universe must be unequal.

To explain the origin of that inequality, physical theories of the early universe cannot treat matter and antimatter on the same basis: As physicists say, they need to violate CP symmetry, which asserts that a system is unchanged under the combined transformations of charge conjugation (C) and parity inversion (P). Experimentally, CP violation has been observed in interactions mediated by the fundamental weak force but not by the strong force; that theoretical conundrum has occupied physicists for decades. It speaks to Ann's brilliance that before she finished her PhD, she single-authored a 1984 paper proposing one of only two popular mechanisms that explains the apparent CP symmetry of the strong force. That mechanism now bears her name and that of another independent proposer, Stephen Barr.

In addition to her academic prowess, Ann cared about all aspects of the aca-

demical experiences of her junior colleagues. With classmates, she started the Harvard Puppet Show tradition, an entertaining way to prepare incoming PhD students for the peculiarities of the prestigious department. Ann enjoyed her work as a physicist and ensured that those around her did too, as is evident from the numerous online tributes ("Ann Nelson, 1958–2019," PHYSICS TODAY online, 8 August 2019).

In 1987 Ann became the first tenure-track woman in physics at Stanford. A year later she moved to the University of California, San Diego. A story Ann liked to tell was that at a conference she attended as a junior faculty member, an older male colleague exclaimed, "I wasn't told there would be ladies here!" Unyielding, Ann understood that sexism and implicit bias keeps minorities and women away from academic physics, and she worked hard to dismantle those. The wake-up call she penned in 2017—"Diversity in physics: Are you part of the problem?" (PHYSICS TODAY, May 2017, page 10)—is an essential read for the theoretical-physics community and beyond.

Ann and her husband-collaborator David Kaplan made their final academic move to the University of Washington (UW) in 1994. Over the course of her successful career, Ann published more than a hundred academic papers. Besides proposing innovative explanations of matter–antimatter asymmetry, she wrote seminal works on supersymmetry, the theory that extends the standard model by relating bosons and fermions, the two types of fundamental particles. She also probed electroweak symmetry breaking, a process that describes both the unification of the electromagnetic and weak forces at high energies and the origin of mass of fundamental particles. Many of her works clarified issues for the entire scientific community and are used as references for a wide array of applications. Ann never lost enthusiasm for innovative explanations of observed phenomena that she grounded in experimental verification.

At UW, Ann is remembered for her support for and engagement in social justice issues as much as for her mentorship and teaching. She wore a Black Lives Matter button in her office and signed her emails with her preferred pronouns. As



DAVID B. KAPLAN

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an adviser, she cared deeply about the mental well-being of her students and postdocs, and she encouraged them to take email-free vacations. She gave lectures at a summer school in Palestine and voiced her opposition to a conference on cosmology and particle physics held in the occupied West Bank in 2018. UW is creating an honorary professorship in her name (see "Honoring a life of mentorship & advocacy: In memory of Dr. Ann Nelson," <https://tinyurl.com/yyyywr3ot>).

Ann and David, both tenured professors, had two children. Their successful example of combining prolific academic careers with a rich family life serves as a model for many aspiring physicists. When one of us asked about the decision to have children, Ann replied that she simply could not imagine a life without them.

Ann and David spent their weekends and holidays trekking the mountain ranges of the Pacific Northwest together, with friends, and with their children. It was on one of those trips that she tragically had a fatal fall. Her loss to the theoretical-physics community leaves a hole that we can only fill by adopting a little more of both her curiosity and her compassion.

Djuna Lize Croon

TRIUMF

Vancouver, British Columbia, Canada

Seyda Ipek

University of California, Irvine

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