MEMORIAL RESOLUTION

Andrew Lenard

(1927-2020)

It is with sadness that we note the passing of Andrew Lenard (92) on March 17, 2020. Andrew was born in Balmazujvaros, Hungary. He survived—barely—the chaos of World War II. With members of his family, he was shipped in a cattle car bound for Auschwitz, which was later misdirected to a labor camp near Vienna. He subsequently came to America at age 19 through New York. His family settled in northern Indiana, with Andrew completing a B.A. (1949) and Ph.D. (1953) in theoretical physics at the University of Iowa. He joined Indiana University in 1966, with an appointment jointly in mathematics and physics.

Andrew's research covered an unusually broad area with the core of his work on quantum many-body problems and statistical mechanics. In 1964, he gave a highly non-trivial proof that the hardcore one-dimensional Bose gas has no Bose-Einstein condensation, answering a question that had evaded previous attempts. Following this, a major scientific impact came with his collaboration with Freeman Dyson at IAS in Princeton during 1965-1966 on the Coulomb Stability Theorem for ordinary matter. This occurs only due to Fermi statistics for electrons. The Uncertainty Principle of quantum mechanics prevents electrons from collapsing into the positive nucleus but their fermionic rather than bosonic nature accounts for the size of a solid of many atoms increasing and not decreasing in size. Dyson and Lenard (1967 & 1968) were the first to rigorously prove this from first principles, thus opening a new horizon in mathematical physics both in terms of concepts and techniques. Their work was instrumental in leading to the extensive results by Lieb and Lebowitz on the existence of the thermodynamic limit for Coulomb systems (1969 & 1972).

During the summer of 1967, while revisiting the Princeton Plasma Physics Laboratory, where he had been a member of the applied mathematics group before IU, Andrew was in a discussion on wave stability in the KdV equation involving Martin Kruskal, who asked whether there was a systematic way of generating more equations with similar properties. Within a short period of time, Andrew came up with a generating function for an infinite number of KdV-like equations with the same conservation law behavior. Even though this result was never published, it is part of the standard framework or bi-Hamiltonian systems and was extended to finite dimensional systems by Gel'fand and Dorfman in 1979. Also in 1967, during a discussion with Elliott Lieb who had calculated the number of 'ice' configurations for a square lattice of size N to be (4/3)3N/2, Andrew recognized this as the number of ways to color the squares of a checkerboard with 3 colors (no adjacent squares with the same color), thus solving one of the few non-trivial coloring problems. With Andrew's modesty, it was left to others to make this known.

While at IU, Andrew collaborated with colleagues in the department, particularly Seymour Sherman, and mentored physics graduate student Sanford Levy on a thesis in statistical mechanics. Andrew also delighted in providing interesting problems on quantum mechanical spin systems for the physics qualifying examination, in addition to teaching undergraduate and graduate courses in mathematics. His early years laid the foundation for him to become a highly skilled pianist, which he enjoyed throughout his life, and he was a fluent speaker of Hungarian, German, French, and English. His papers are exceptionally well written, as one can learn from his foreword to the Battelle Seattle 1971 Rencontres on statistical physics. Earlier on, reviewing his paper on the Miquelian Moebius plane, K. Strambach

commented, ‘the style of the paper gives it the rank of a piece of German literature.’ Andrew was profoundly grateful for the chance to come to America and begin his life anew, and he ended his life caring for Veronica, his wife of 67 years, in a room they shared at Autumn Hills Special Care Center in Bloomington.

For more on Andrew Lenard’s contributions to research, please see Elliott H. Lieb’s article “In Memoriam: Memories of Andrew Lenard”, IU Math Journal, vol. 69 issue 4, pp. 1505-1506, which you can find online at the IUMJ website https://www.iumj.indiana.edu/.

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