

PREFACE

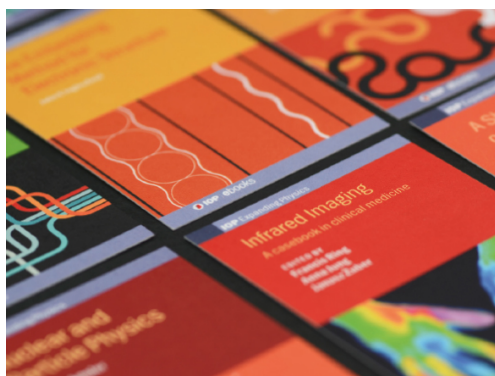
A passion for theoretical physics: a special issue in memory of Peter G O Freund

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Preface



A passion for theoretical physics: a special issue in memory of Peter G O Freund

We dedicate this special issue to the memory of our esteemed colleague, inspiring teacher and cherished friend, Peter Freund (figure 1). Peter George Oliver Freund was born on 7 September 1936 in Timișoara, Romania. He obtained his PhD under the supervision of Walter Thirring at the University of Vienna in 1960. He came to the University of Chicago in 1963, where he remained throughout his career. He passed away on 6 March 2018.

Peter's early influential work [1] proposed what became known as the Freund–Harari conjecture, whose far-reaching impact is discussed in the contribution to this special issue by Veneziano [2], see also the review by Peter himself [3]. Dual resonance models (which were ultimately understood to be string theories) appeared soon afterwards, and Peter was among the few theorists at that time who took seriously the extra dimensions required for their consistency. Indeed, extra dimensions figured prominently in much of Peter's subsequent work, including the Cho–Freund paper [4] that helped launch a renaissance in Kaluza–Klein theories, the Freund–Rubin solution [5] that has played an important role in the AdS/CFT correspondence, his Kaluza–Klein cosmological solutions [6], and his work [7] that presaged the heterotic string. His book with Applequist and Chodos on Kaluza–Klein theory [8] became the standard reference on the subject. Many contributions to this special issue are devoted to gravity, string theory or higher dimensions [9–24].

Symmetry was a leitmotif that ran through much of Peter's work. He was an early proponent of supersymmetry, which plays a central role in string theories that incorporate fermion degrees of freedom. The Freund–Kaplansky paper [25] classified the simple graded Lie algebras; and Peter's book on supersymmetry [26] remains to this day a valuable introduction to the subject.

Several contributions to this special issue focus on symmetries of various kinds [27–35].

In his lectures at UC, Peter highlighted Noether's theorem, which is also highlighted here in the contribution by Deser [36]. But Peter was also quick to point out that not all conservation laws come from symmetries. Indeed, the Arafune–Freund–Goebel paper [37] showed that the 't Hooft magnetic charge is a topological invariant. Topology also played a key role in the Eguchi–Freund instanton solution [38].

In later years, Peter became interested in p-adic numbers in physics. The Freund–Witten paper [39] on p-adic string amplitudes and related work [40–42] created significant excitement in the theoretical physics community, briefly recalled here in the contribution by Frampton [43]. Although interest in p-adics then waned, it has recently experienced a renaissance in the context of the AdS/CFT correspondence, largely due to Gubser, who (together with his students) contributed to this special issue [44]. Sadly, this is one of Gubser's final works, since he died shortly afterwards in a tragic mountaineering accident.

Peter's late work [45] with his students on exact S -matrices for integrable perturbations of conformal field theories was also influential. Several contributions to this special issue focus on perturbations of CFTs or integrability [46–50]. The contribution by Witten [51] is a landmark work on tensor models.



Figure 1. Peter G O Freund. Credit: the Freund family.

‘Multiple dimensions’ was both a dominant theme in Peter’s work, and also aptly characterized his other personas. He was a sonorous baritone, who performed in occasional solo recitals. Schubert was a particular favorite of his. He was also a writer, whose works included an acclaimed book [52] on prominent physicists of the 20th century, as well as a novella and numerous short stories. He was a polyglot (including Hungarian, Romanian, German, French and Italian, besides English) and a raconteur par excellence. His knowledge of history and music was encyclopedic; and he had seemingly boundless energy, invariably brimming with irrepressible excitement over new ideas. He was not only a student of Nature’s forces, but he was himself a veritable force of Nature.

Peter is survived by his wife Lucy, his daughters Pauline and Caroline, and his five grandchildren, for whom he cared deeply and was very proud.

He is deeply missed by his family, friends, colleagues and students.

Acknowledgments

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