同济大学 TONGJI UNIVERSITY

物理科学与工程学院
声子学与热能科学中心

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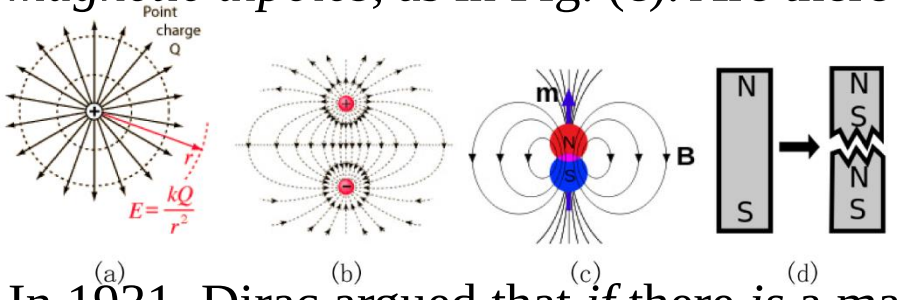
时间：4月11日（周三）下午1:30-2:30

地点：南校区第一实验楼423会议室

The elusive magnetic monopole from a Solid-State physics point of view（用固体理论观点看磁单极子）

The sources of the electric field **E** are point charges (monopoles) from which the field lines emerge isotropically, as in Fig. (a). When positive and negative charges are set close to each other, they form an *electric dipole* as shown at Fig. (b). On the other hand, the sources of the magnetic field B (currents or magnetic materials), are *magnetic dipoles*, as in Fig. (c). Are there also *magnetic monopoles*? So far they are not found in Nature. As children, you probably tried to get magnetic monopoles by breaking a magnetic bar, as in Fig. (d). Did you succeed?



In 1931, Dirac argued that *if* there *is* a magnetic monopole of strength g, then there is a quantization rule involving the electron charge e, the Planck constant h and the speed of light c: $2eg = n\hbar c (n = 0, 1, 2 \ldots)$. This amazing quantum mechanical constraint stimulated an enormous research activity in numerous areas of physics (including fruitless search attempts). A Google search under magnetic monopole covers tens of pages.

In this talk, using a tight binding model, I will address and solve the hydrogen-like problem: An electron in the field of magnetic monopole. The Dirac quantization emerges naturally and the underlying physics employs beautiful (albeit simple) mathematical tools such as gauge theory, spherical geometry, perfect polytopes, graph theory and point groups. Remarkably, I will also show that there is an experimentally accessible system whose spectrum coincides with that of the electron-magnetopole system.

报告人简介：

Yshai Avishai，1964年本科毕业于Hebrew University，1966年获得Hebrew University核物理硕士学位，1970年获得Weizmann Institute核物理博士学位，2013年获得Ben Gurion University 经济学硕士学位。1985年获聘为Ben Gurion University 教授。主要研究领域包括量子力学、低维体系电输运、金属及超导量子点、强关联电子、近藤效应、非线性响应、量子霍尔效应、冷原子物理、拓扑绝缘体等。荣获美国物理学会会士，2014年评为APS杰出审稿人，2008-2014为PRL编委会成员，前以色列物理学奖评审委员会委员，当选欧洲物理杂志科学咨询委员会主席。发表论文238篇，出版书籍3本。