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Prof. Vladimir Fridkin

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Parity Nonconservation and Bulk Photovoltaic Effect in the Crystal Without Symmetry Center

The theory and the experimental characteristics of the bulk photovoltaic effect in ferroelectric and piezoelectric crystals is considered. This new effect is caused by violation of the principle of detailed balancing for nonthermalized carriers. It is a true bulk effect, distinct from the familiar junction photovoltaic effect that accounts for the operation of solar cells and photodiodes, where the open-circuit voltage is comparable to the band gap, a few volts, typically. In contrast, for the Bulk Photovoltaic Effect (BPE), the open-circuit voltage scales with crystal thickness and can reach thousands of volts, even under very weak illumination. Prof. Fridkin will describe the discovery of the BPE, the development of the fundamental theory of it, and some of its applications.

Bibliography: *Photoferroelectrics*, by V. M. Fridkin, (Springer-Verlag, Berlin, New York, 1979); *Photovoltaic Effect in the Ferroelectrics and Related Phenomena*, by V. M. Fridkin and B. I. Sturman (Gordon and Breach, New York, 1990); "Bulk photovoltaic effect in noncentrosymmetric crystals," by V. M. Fridkin, *Crystallography Reports* **46**, 654-658 (2001); "Solar Energy: Ferroelectric Photovoltaics," H. T. Huang, *Nature Photonics* **4**, 134-135 (2010).

**Wednesday, June 27
4:00 pm
Room 136, Jorgensen Hall**

**Host:
Dr. Stephen Ducharme
Department of
Physics and Astronomy**

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