Physics
AT QUEENS COLLEGE

Colloquium Notice

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India-U.S. Visiting Professor Lecture: "The Stability of Matter"

It is an intriguing question why ordinary matter that interacts through Coulomb 'forces' should remain stable at all and not collapse, unlike its gravitational analogue on the cosmic scale. It turns out that a naive 'explanation' based on the Heisenberg Uncertainty Principle alone turns out to be fallacious! On the other hand, it is the fermionic nature of the electron entailing the Pauli Exclusion Principle that actually endows matter with stability. In this colloquium, following Lieb's monumental work, stability of ordinary matter will be discussed threadbare. Also, an upper bound on the number of bound states for an arbitrary attractive potential will be derived using some simple mathematical inequalities. Once again, following Lieb, an interesting upper bound on the maximal degree of negative ionicity possible will be derived, and impossibility of a neutral atom and positron ever forming, albeit an exotic 'quasi-bound-state', will be established. Stability of polar and non-polar molecules and molecular clusters subjected to high external electric fields will also be examined. While in many cases the external field distorts or decomposes the molecular cluster, in some other selective cases, it can strongly bind two molecules exhibiting an exotic phenomenon of 'field induced covalence'.

Wednesday
June 2, 2010
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326