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SEMINAIRE SPAM / LFP

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Le Vendredi 5 mars 2010 à 11h00
Bâtiment 522 - Salle 137

«Raman Transparency and the Electroweak Theory»

Raman effect which was discovered almost 80 years ago, has revolutionized laser spectroscopy, most of the aspects being of the applied kind. However, there are a few fundamental aspects that remain to be explored. Maquet and Rahman calculated with an exact computation for the hydrogen atom, that for an S-S transition, the Raman effect goes through an exact zero as a function of the external frequency. This has not yet been seen experimentally. However, when that is found, the zero, i.e., the Raman Transparency (there will be no Raman photon emitted) will be the effect of the electroweak theory of Glashow, Salam and Weinberg and not that of Maxwell-Raman theory. Since matter is described more exactly by the electroweak theory (a spontaneously broken gauge theory), the exact location of the zero is a consequence of the electroweak theory. While this will be a hard experiment with the hydrogen atom, it should be easier to see with heavier hydrogenic atom such as the sodium atom, where an analogous diminution of the Raman signal has been seen by Peter Toschek in Hamburg. Possible better candidates are the heavy atoms such as the Bismuth atom, where relativity has to be taken into account and the parity violating electroweak transitions have been observed at Oxford and Novosibirsk. We plan to extend our calculation to such cases. But it is important to note that here we have the principle of yet another unique test of the electroweak theory apart from the discovery of the W and the Z bosons, the discovery of the neutral current and the above mentioned atomic spectroscopy. It is rather novel. In this context, one ought to refer to the work of the ETH group led by Martin Quack that has clearly showed that for larger molecules, there is a clear energy difference between the right handed molecules with respect to the left handed molecules for the biological molecules. However, for molecules, the effect is too small to be observed with present level sensitivity of spectroscopy.

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Sans autorisation, vous ne pourrez entrer sur le Centre de Saclay. Tél. : 33.1.69.08.30.95 - Fax : 33. 1.69.08.76.39 - email : caroline.lebe@cea.fr ou veronique.gereczy@cea.fr
Dans TOUS LES CAS, se munir d'une pièce d'identité (passeport et carte d'identité – pas de permis de conduire)