Van der waals forces and trapping of atoms in dielectric cavities

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Project details

<table>
<thead>
<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
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<td>Not available</td>
<td>0302 - Post-doctoral research training grants</td>
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EU contribution: Not available

Coordinated in: Greece

Objective

The objective of the proposed research is to study the van der Waals interaction between a single atom and a micron-sized parallel-plate dielectric cavity. Several experiments have shown that the energy and lifetime of an excited atom are strongly modified inside a metallic cavity, but as yet there have been no such measurements in dielectric cavities. The first objective is to investigate the basic theory of interaction between an atom and a dielectric surface in the simplest case using an alkali atom and the walls of a fused silica cavity. The second objective is to investigate the optical level shift and lifetime of the 13s-state of a Cesium atom inside a CdTe cavity. This is an interesting special case because the 13s>12p transition in Cs is almost resonant with an optical phonon in CdTe. We therefore expect the atom-phonon system to form a strongly coupled state, giving the 13S state quite different energy shift and lifetime from the neighbouring Rydberg levels, which are not resonant with the cavity walls. The third objective is to use the van der Waals interaction as an extremely sensitive probe of the spatial distribution of the de Broglie wave of an atom in a cavity.

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Subjects

Education and Training - Scientific Research - Social sciences and humanities

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