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TWO MOLECULES COUPLED TO A NANO-MECHANICAL OSCILLATOR

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It has been predicted that the flexural mode of a carbon nanotube can couple strongly to an electronic two-level system present in single molecules [1, 2] . Detection and manipulation of the oscillator is possible by exciting the two-level system with a laser and measuring the fluorescence photons [3]. The coupling is based on the (static) Stark effect, and the displacement dependence of the two-level system energy splitting. In this work we investigate how two two-level systems can be coupled by a single mechanical oscillator.

We find that the effective interaction can entangle the two molecules. We also find that the effect of the electromagnetic and mechanical environment has to be reconsidered, in view of the strong coupling of the two-level system to the oscillator. Our preliminary results show that spectroscopic measurements could be used to observe the entanglement generated by the oscillator.

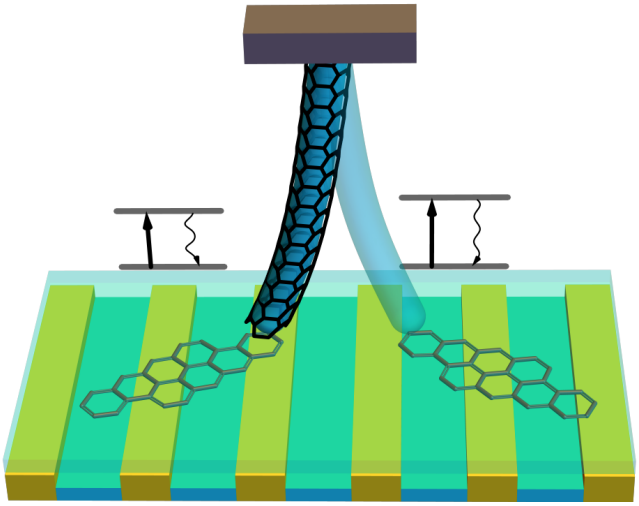

Figure 1: Schema of the system of two molecules coupled to a mechanical oscillator.

References

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