

Thematisches Masterseminar SS2021, Dienstags 14h15

"Quantum cooperativity of light and matter"

We are fascinated by the various aspects of quantum cooperativity. We will address this topic in an overarching manner, joining experimental and theoretical physics, bridging between atomic and quantum optical model systems and condensed matter systems.

The quantum cooperativity may result in collective light emission, featuring spectacular non-classical behavior. Or, alternatively, atoms and ions and even solid state systems show quantum cooperativity. Here, the systems may undergo transition to entangled states, which is mediated by collective degrees of freedom. The Spin-Boson model is the prominent example, and serves for understanding genuine collective effects.

As all talks will contribute to the same common theme, there is a large additional benefit for students, as they understand on top of the individual topic the entire field, theory, model systems and applications. Please address fsk@uni-mainz.de with your interest, and we will have a first meeting via zoom 13.4.2021

<https://us04web.zoom.us/j/980765407?pwd=d2Q2VHV4dkRsMVovYUJVaWVkeVVzdz09>

Meeting-ID: 980 765 407, Passwort: 018559

Date	Topic	Supervisor	Student
11.5	Super- and Sub-radiance light emission from optical lattices, Dicke states	Windpassinger	Filling, Hilker
18.5	Entangled multi-photon states and applications in quantum communication	van Loock	Akdogan Heger
25.5	Collective light scattering in cold atomic samples, Anderson localization	Windpassinger	Hatoum, Fink
1.6	Spin entanglement in single donor systems in Diamond	Wickenbrock	Dhungel
1.6	Quantum limits and fundamental physics of measurement with levitated ferromagnets	Budker	Walter
8.6	Collective light scattering off ion on a crystal	Wolf, Schmidt-Kaler	Conta
8.6	Collective spin interaction in trapped ion quantum processors, MS and geometric quantum gate	Poschinger	Orth
15.6	Spin Boson model, key examples and applications	Marino	Klingelhöfer
15.6	Dissipative entangled state preparation	Marino	Baßler
22.6	Matter wave interference in BEC	Pohl	Häussler
22.6	Collective quantum states for enhancement of measurement accuracy	Smorra, Walz	Tscharn

29.6	Quantum friction and collective structural transitions tested with ion crystals, Aubry transition	Oleksiy, Stopp Schmidt-Kaler	Klein, Leichtweiß
6.7	Mirrorless lasing, superadiant lasing	Budker	Laborenz

Organization:

- Sprache je nach Wunsch deutsch oder englisch
- Every student is supposed to give an approx. 30 minutes talk on the topic selected.
- Contact your talk supervisor at least 4 weeks prior to your presentation for material
- have a first version ready at least 2 weeks before the talk and send him
- schedule a test talk with your supervisor for the week before the talk
- after the talk, upload your talk onto the drop box folder to share it with your colleagues
- Most importantly: have fun!