

Meet Us

Frauen *machen* Physik

Programm

13:15 Uhr

Arnimallee 14, E2:1.1.53

Come Together:
“Frauen machen Physik”
Erfahrungsaustausch mit
Physikerinnen des Fachbereiches
bei Snacks und Getränken

15:15 Uhr

Arnimallee 14, Hörsaal A

Dr. Anja Metelmann
Emmy Noether Nachwuchsgruppe,
„Directionality in
engineered quantum systems“

Organisation

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Sponsoring



Meet Us

Frauen *machen* Physik

Freitag, 09.11.2018, 13:15 Uhr
Arnimallee 14, Raum:1.1.53



Meet Us

Women *do* Physics

Program

1:15 p.m.

Arnimallee 14, E2:1.1.53

Come Together:

“Women do physics ”

Share experiences with female physicists of the department
snacks and drinks are served

3:15 p.m.

Arnimallee 14, Hörsaal A

Dr. Anja Metelmann

Emmy Noether Nachwuchsgruppe,

„Directionality in
engineered quantum systems“

Dr. Anja Metelmann:
Emmy Noether Nachwuchsgruppe
FB Physik, Freie Universität Berlin

„Directionality in
engineered quantum systems“

Reciprocity is a fundamental symmetry in physics; in optics it can be understood as the principle of ‘if I can see you, you can see me’. Breaking this symmetry results in asymmetric information transfer between two systems, i.e., the transmission amplitudes change under the exchange of source and detector. In the optimal situation, information transfer only occurs in one direction, which is a highly valuable feature for quantum information processing, where one aims to read out a quantum system while protecting the signal source. The violation of the symmetry of reciprocity requires rather special conditions, and one may ask the question if there is a general way to break reciprocity between two systems. This is indeed possible, we find that one can construct nonreciprocal interactions by combining the appropriate coherent and dissipative dynamics. Our nonreciprocity concept was experimentally confirmed within an optomechanical array setup in a

collaboration with Oscar Painter’s group at Caltech. Furthermore, a number of related experiments can essentially be mapped to our approach as well. Overall, the nonreciprocity protocol is a powerful tool for realize directional interactions between two quantum systems and its full potential has yet to be explored. In this talk I give an introduction of the basic concept on how to engineer nonreciprocal interactions and devices. Furthermore, I present possible implementations in superconducting circuit and optomechanical architectures and give an outlook about how directionality in engineered quantum systems can be of relevance for the processing and storage of quantum information, as well as for the unraveling of sensitive fundamental knowledge of systems in the quantum regime.

