Research Networking Programmes

Short Visit Grant ☒ or Exchange Visit Grant ☐

(please tick the relevant box)

Scientific Report

The scientific report (WORD or PDF file – maximum of eight A4 pages) should be submitted online within one month of the event . It will be published on the ESF website.

***Proposal Title*:** **Novel topological phases in optomechanical arrays and ultracold atom systems**

***Application Reference N°*:** **7294**

1) Purpose of the visit

The main motivation was to explore the connection between optomechanical arrays and cold atom systems in particular with regards to the possibility of engineering novel topological phases in bosonic systems.

2) Description of the work carried out during the visit

On the 6-th of July, the starting date of my stay at ICFO, I have given a talk presenting the latest developments of my research. This inspired intense discussions in the following days. Part of the talk dealt with our recent proposal to use bosonic anomalous terms to generate a topological bosonic state without any direct analog in fermionic systems. Such idea could be implemented in a cold atom system and has inspired intense discussions in the following days with Dr. Massignan and Prof. Dr. Leticia Tarruel (one of the main goals of Prof. Tarruel current research is to create topological states of cold atom systems on shaken exotic lattices).

On the 6-th of May, I also had the chance to discuss with Prof. Dr. Derrick Chang and Prof. Dr. Adrian Bachtold about the latest developments of their high impact research focusing on opto- and nano-mechanics.

On the 7-th of July, I had a long discussion with Prof. Dr. Maciej Lewenstein who gave me an overview over the far reaching research activities of his Quantum optics theory group.

Throughout the duration of my stay, I and my host Dr. Massignan were able to exchange many ideas on topics ranging from dissipation in open quantum system out of equilibrium, topological systems, few-body interacting systems.

3) Description of the main results obtained

The interaction with Prof. Lewenstein, Prof. Tarruel and Dr. Massignan gave me a broader perspective on the research in cold atom system both on the theory and the experimental side. This will be very useful because many ideas we are developing in Erlangen in view of the experimental progresses in optical and optomechanical crystal could also find application in cold atom systems.

4) Future collaboration with host institution (if applicable)

5) **Projected publications / articles resulting or to result from the grant** ***(ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant)***

6) Other comments (if any)