



Call 2017

# NAQUAS

Non-equilibrium dynamics in Atomic  
systems for QUAntum Simulation

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# SUCCESS STORY (highlights)



## CHALLENGE

Understanding **dynamics of quantum many-body systems**, especially across a phase transition. Key to the development of **quantum simulation**

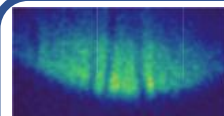


## SOLUTION

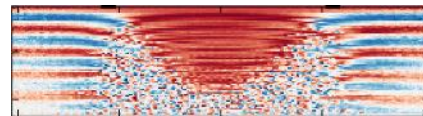
Combining **experimental**, **numerical** and **theoretical** approaches



## (SOME) OUTCOMES

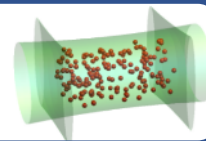


Joint work on **quantitative understanding** of Kibble-Zurek in atomic gases

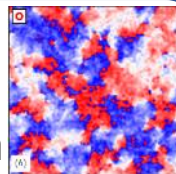


Unexpected extension to spin mixture dynamics  
Development of a **new setup**

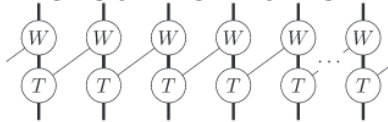
Wide exploration of **new dynamical behaviors**,  
e.g. Interaction quenches, link to turbulence



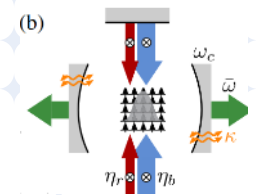
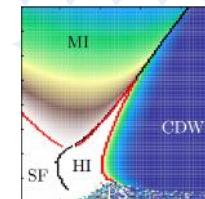
**Exotic phase transitions**  
e.g. 2D,  
delocalization-localization



Developing **tools**:  
tensor networks



Exploration of **new systems**. e.g. infinite range interactions, driven-dissipative, dipolar



# IMPACT (RRI aspects)



## GENDER:

- 20% of female researchers. Low but lack of applicants.



## OPEN SCIENCE:

- All ~80 publications in open access on **arXiv** repository. (Available from NAQUAS website)
- Several codes developed for NAQUAS available on **github** repository
- Most published **data available** (from the journal, national institution...)



## SCIENCE EDUCATION:

- ~15 **PhDs and postdocs** hired by NAQUAS

# IMPACT (potential users)



## RELEVANT APPLICATIONS

- Development of **quantum sensors** based on cold atom systems
- Benchmarking of current **quantum simulators/annealers**
- Quantum **metrology** in many-body quantum systems



# QUANTERA

ERA-NET Cofund in Quantum Technologies



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