

# CS Seminar

## **QICI Seminar: Quantum Edge Detection**

**Professor Emili Bagan,  
University of Barcelona**

**Date & Time:**  
**May 18, 2023 (Thurs)**  
**4:00pm (HKT)**

**Venue:**  
Zoom & Rm 308, Chow Yei  
Ching Building, HKU

**Remark(s):**  
Mixed mode (online and  
on-site)

### **Abstract:**

This talk focuses on our ongoing research regarding a task we have coined "quantum edge detection," alternatively referred to as "quantum fragmentation." In one dimension, our aim is to identify the points (edges) at which a chain of qudits undergoes abrupt transitions from an unknown state to another unknown state. For simplicity, we explore a scenario featuring a single edge, uniformly distributed along the chain. We show that this problem can be efficiently formulated as a semidefinite programming (SDP) problem. Notably, despite the increasing number of potential edge locations as the chain's length ( $N$ ) grows, the optimal protocol achieves a finite limiting probability of success. In the case of qubits, this success probability reaches 0.65, and it increases asymptotically to 1 as the local dimension ( $d$ ) of the system grows. Furthermore, we briefly touch upon various extensions of the problem, such as closed chains of states and scenarios involving known-unknown states.

### **About the Speaker:**

Emili Bagan is a Professor of Theoretical Physics at the Autonomous University of Barcelona (UAB). He is the founder of GIQ, the Quantum Information Group at UAB, which is one of the very first groups on quantum technologies in Spain. He authored about 140 papers on Quantum Information and High Energy Physics. He is an A. V. Humboldt Fellow and was a researcher at Brookhaven (BLN), New York, at the University of Cambridge, and at the University of Heidelberg. Recently, he has been Visiting Professor at CQT Singapore, Hunter College of the City University of New York and HKU.

### **How to join the group meeting:**

#### 1. Zoom link

Time: May 18th, 2023 04:00 PM Hong Kong SAR

Join Zoom Meeting:

<https://hku.zoom.us/j/91780656251?pwd=VnVmbzBmZXVUeWdod3Z1OXJ4YXF4dz09>

Meeting ID: 917 8065 6251

Password: 346796

#### 2..To join in person: Room-308, Chow Yei Ching building.

**All are welcome!**

**For enquiries, please call 2859 2180 or email  
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