

Vibration Sensing over Metropolitan Fibers

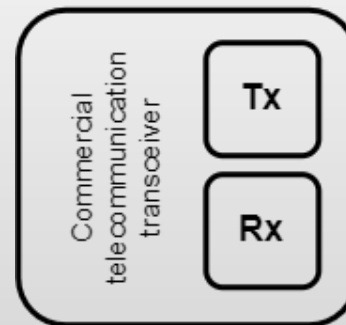
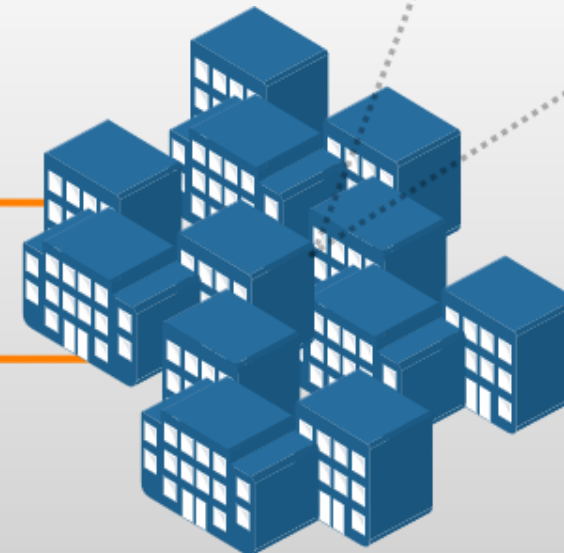
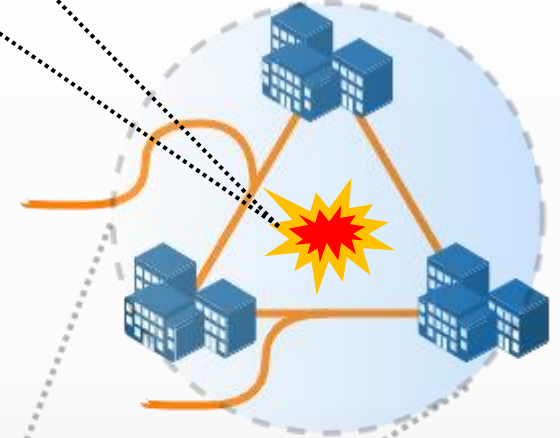
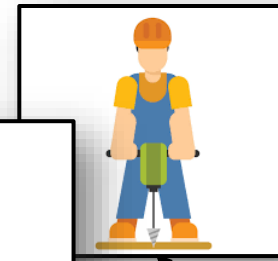
Photonext Day 2023

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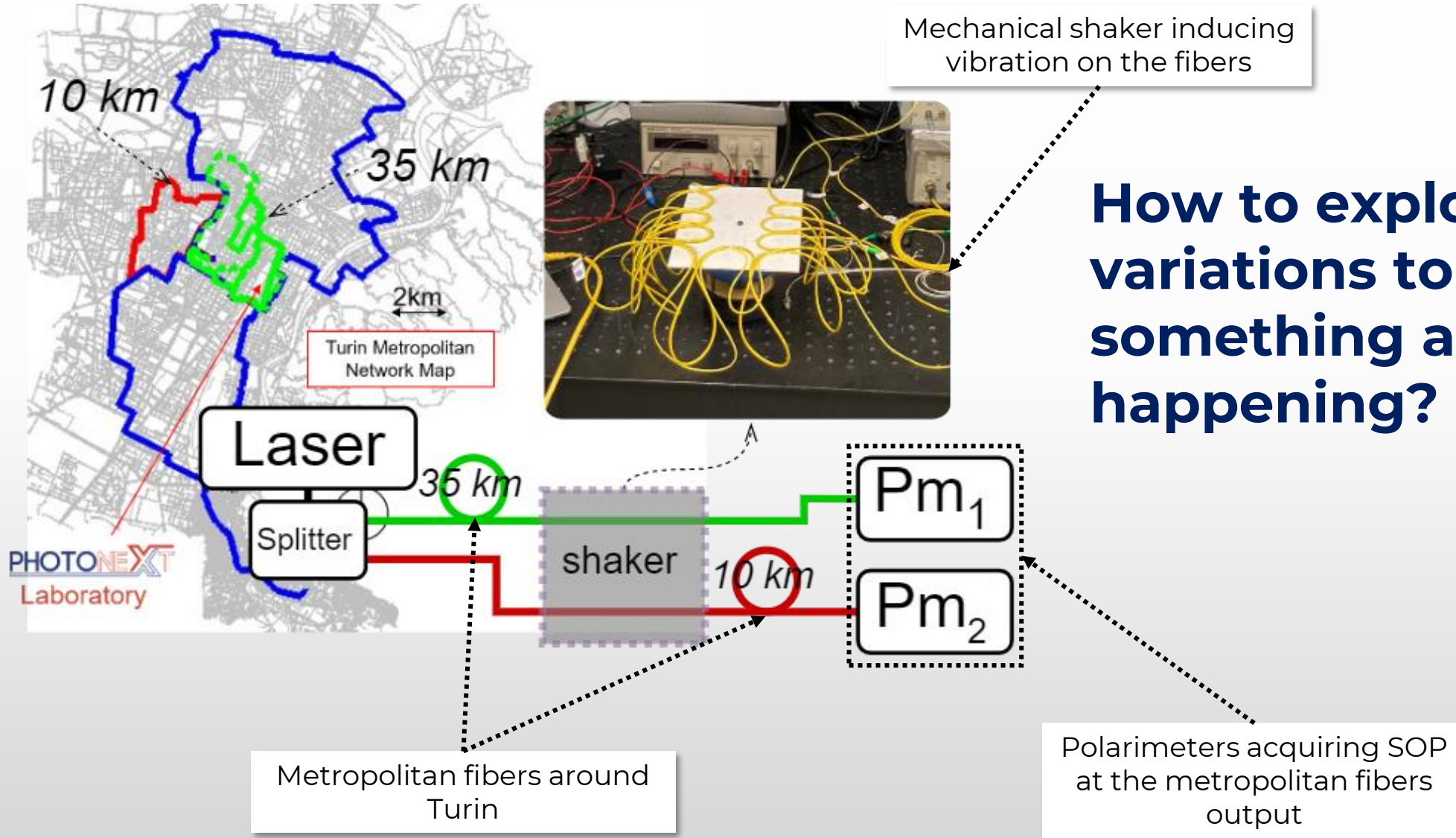
Goal of my research

- Exploit already installed **telecommunication fibers** to sense **anomalous events** happening in an **urban scenario**.
- How? By means of **State of Polarization (SOP)** changes induced by external **mechanical stresses**, which impact on optical fiber **birefringence**.



Important for:
Monitoring the **health of the fiber network** and avoid damages like **fiber cuts**.

Working scenario

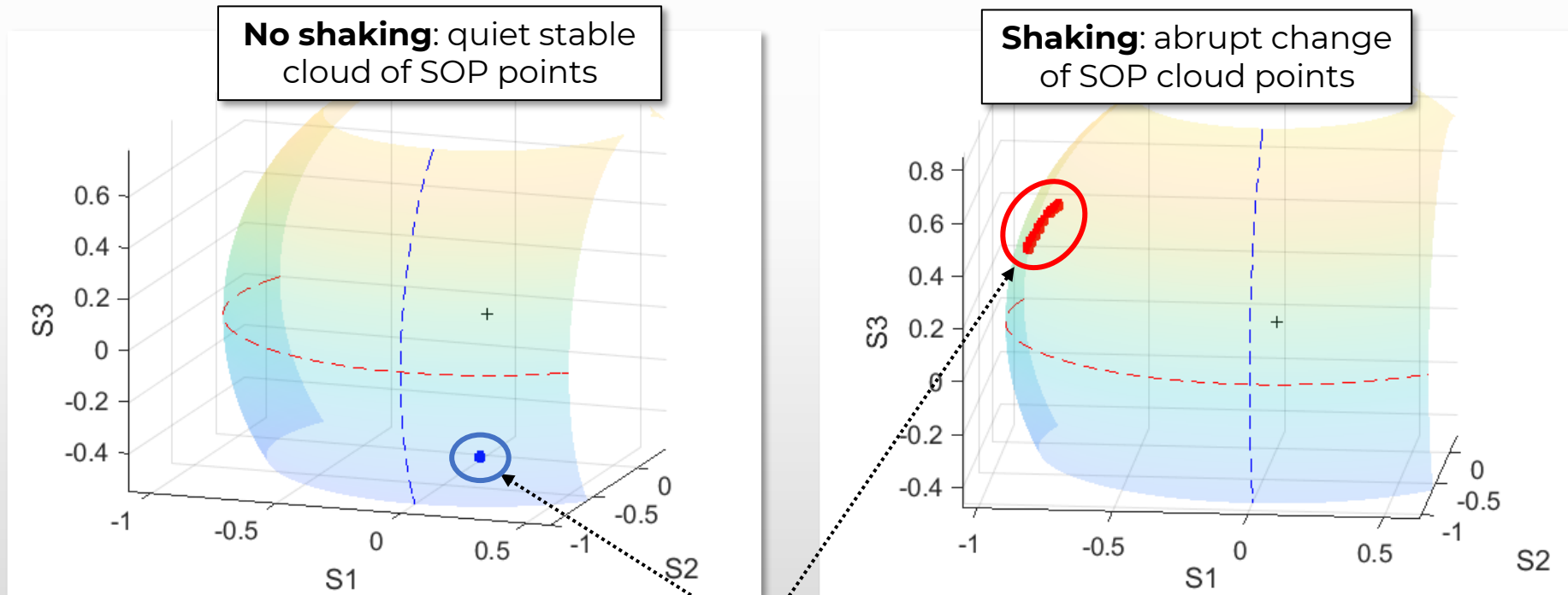
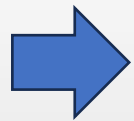


SOP monitoring idea



When mechanical stresses happen, the SOP changes completely and abruptly on the sphere.

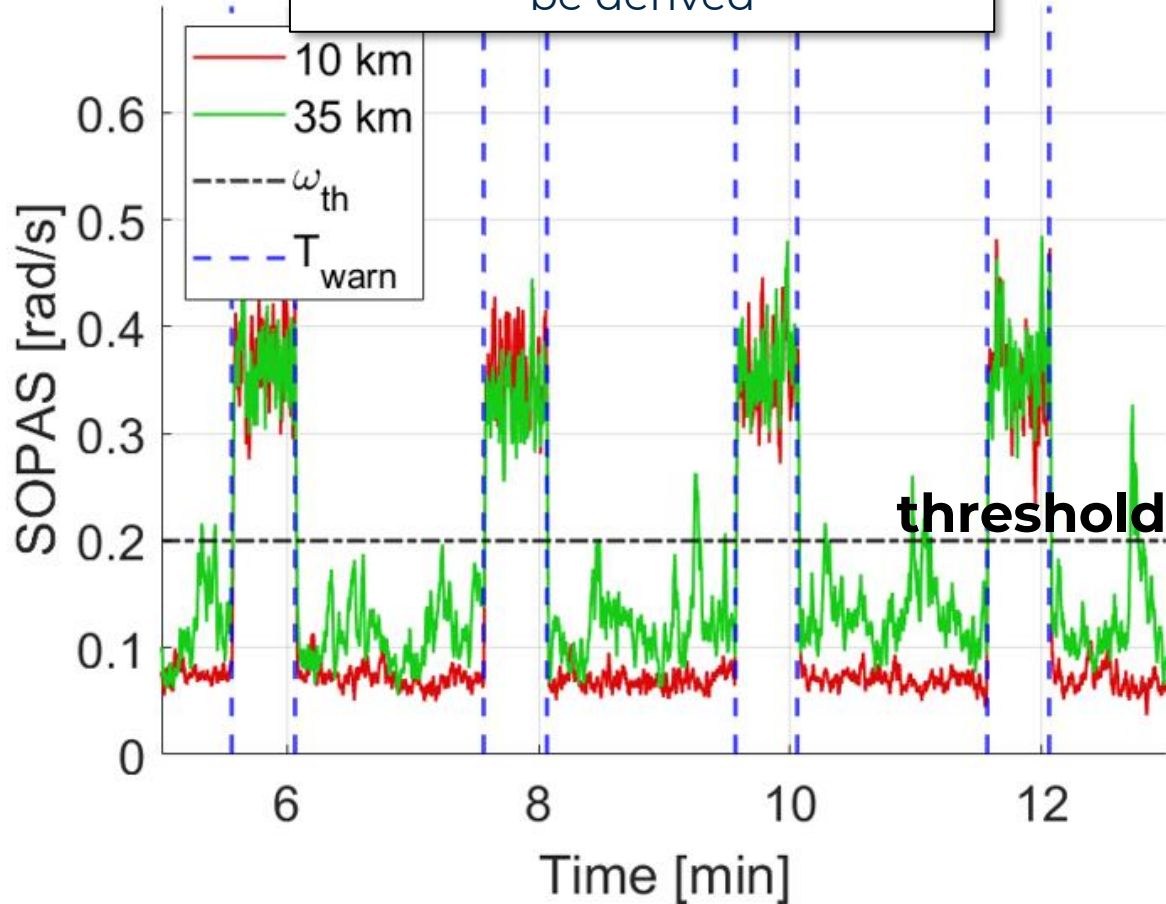
Poincaré sphere



Clouds of hundreds of SOP points!

Monitoring algorithm

A SOPAS based algorithm can be derived



Monitoring **two metropolitan fibers** at the same time

Check if **SOPAS > threshold** on both fibers in the **same time window**

If this happens, **alarm is generated**

If this does not happen, **alarm is not generated**

Advantages of this algorithm:

Reduced False alarm probability!

**THANK YOU FOR YOUR
ATTENTION**
