

Dipartimento di Matematica

SEMINARI



## Mathematics for Data Science, Artificial Intelligence, and Machine Learning

### Thursday, March 17, 2022 – at 3:30 p.m.

Seminar Room "-1", Povo0, Via Sommarive 14, and online through the ZOOM platform https://unitn.zoom.us/j/81698041878 (Passcode: 028649)

# **Giovanna Citti**

(UniBO & Centro Linceo Beniamino Segre)

## Lie symmetries in CNN architectures

#### **Abstract:**

In this paper we study the spontaneous development of symmetries in the early layers of a Convolutional Neural Network (CNN) during learning on natural images. We consider a first layer with only one filter, which will show a rotational symmetry. As it is well known the filters of the next convolutional layer can be approximated by Gabor functions, which can be parametrized by rotation and translation variables. We equip this layer with a diffusion kernel, to be compared with fundamental solution of Laplacian in the group, in accordance with group-based models of V1 horizontal connectivity.

Contact person: Gian Paolo Leonardi

#### CONTATTI

Staff di Dipartimento - Matematica tel. 0461 281508-1625-1701-3786 <u>dept.math@unitn.it</u> <u>www.maths.unitn.it</u>



ACCADEMIA NAZIONALE DEI LINCEI CENTRO LINCEO INTERDISCIPLINARE "BENIAMINO SEGRE"

