# StaTalk2018@PoliMi

## May 4th, 2018

# PROGRAM

| | | |
|---|---|---|
| 09:30 | | REGISTRATION<br>(Aula Magna) |
| 10:00 | INTRO | INTRODUCTION<br>(Aula Magna) |
| 10:15 | | TALK: Administrative Data<br>*Chiara Masci*<br>(Aula Magna) |
| 10:35 | | TALK: Neuroscience<br>*Aymeric Stamm*<br>(Aula Magna) |
| 10:55 | | TALK: Climate Change<br>*Matteo Fontana*<br>(Aula Magna) |
| 11:30 | | TALK: Earth Science<br>*Alessandra Menafoglio*<br>(Aula Magna) |
| 11:50 | | TALK: Smart City<br>*Jacopo Di Iorio*<br>(Aula Magna) |
| 12:10 | | TALK: Industry 4.0<br>*Nicholas Tarabelloni*<br>(Aula Magna) |

| 12:30 | | LUNCH BREAK |
|---|---|---|
| 14:00 | | **PANEL SESSION: Earth Science** *Vladislav Ivan Ivanov, PhD; Prof. Anna Scotti* (Aula Seminari, 3rd floor) |
| 14:00 | | **PANEL SESSION: Neuroscience** *Dr. Alberto Bizzi; Aymeric Stamm, PhD* (Aula Seminari, 6th floor) |
| 14:00 | | **PANEL SESSION: Industry 4.0** *Marco Luigi Grasso, PhD; Carlo Torniai, PhD* (Sala Consiglio, 7th floor) |
| 15:15 | | COFFEE BREAK |
| 15:45 | | **PANEL SESSION: Administrative Data** *Prof. Emanuele Lettieri; Veronica Minaya, PhD; Mara Soncin, PhD Candidate* (Aula Seminari, 3rd floor) |
| 15:45 | | **PANEL SESSION: Climate Change** *Andrea Flori, PhD; Prof. Massimo Tavoni* (Aula Seminari, 6th floor) |
| 15:45 | | **PANEL SESSION: Smart Cities** *Prof. Michela Arnaboldi; Prof. Valeria Fedeli* (Sala Consiglio, 7th floor) |

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# ABSTRACTS

**ADMINISTRATIVE DATA** - Administrative data are getting more and more used in public sectors, such as Healthcare and Education. Since a huge amount of anonymised information are recorded, we can refer to them as big data. Several steps are fundamental to exploit their richness. First of all, the definition of precise research questions is essential, then proper statistical models and methods are required, while having an impact in the real world is the crucial final step. However, the core part of all this process is the continuous interaction between statisticians and policy makers, who have to tackle together this challenge in order to move from theory to practice.

**NEUROIMAGING** - Statistics in neuroimaging is a challenging field due to the complexity of the anatomy and function of the brain. We will focus on brain microstructure mapping through diffusion magnetic resonance imaging (dMRI) and how to turn MR images into maps of neurons. This implies designing appropriate estimation schemes that account for the unique properties of noise in MRI, and statistical methods that exploit the local diffusion information to trace neurons throughout the brain. Functional data analysis effectively provides such statistical tools, allowing also to produce innovative interpretation keys for the clinicians: we will show examples of tumour lesion detection along the cortico-spinal tract for helping pre-surgical planning of tumour removal surgery.

**CLIMATE CHANGE** - Climate change is, by far, the biggest threat humankind is facing right now. A lot of research efforts are being done to study its evolution, and what are the best possible measures to reduce its impact. Statistics plays a role in many of them, thanks to the abundance of good data, and the ability to process it. But this abundance calls for statistical techniques that are able to cope with this. A very promising field of research is the use of Functional Linear Models, novel regressions methods that use as both response variables and covariates a set of functions.

These kind of methods pose very interesting challenges both from an applied and theoretical perspective.

**EARTH SCIENCE** - Earth Science problems often provide data distributed over a spatial domain, that can be analyzed in the context of spatial statistics. In recent years, spatial statistics has assumed a key role in modeling and predicting complex geophysical variables, possibly distributed over large or highly textured regions. In this framework, Object Oriented Spatial Statistics (O2S2) is a system of ideas and methods that allows to analyze high dimensional and complex spatial data, interpreted as objects in appropriate mathematical spaces. We discuss the extension of key geostatistical concepts and methods in the context of O2S2 and present recent extensions to the analysis of object data distributed over complex regions.

**SMART CITIES** - Nowadays, thanks to data analysis and statistics, it is possible to have new insights of a city, figuring out other urban dimensions that human sight is not able to perceive, in order to have a more complete and compelling description of the typical dynamics of a city. We will introduce some statistical tools such as functional biclustering and sentiment analysis, able to capture citizens' mobiles and thoughts. This new quantitative perspective to the city can suggest new citizen and data driven policy for a better urban welfare.

**INDUSTRY 4.0** - Widespread research and development of solutions within the Industry 4.0 framework is a key point that may drive strategic advantages over competitors. The recent increase of applications in this area has been greeted as the beginning of a fourth industrial revolution. There are many factors that make these applications possible. The most important ones are, on the one hand, the adoption of IoT and digital practices that allow to collect big amounts of data, and on the other hand the development of suitable models and algorithms that can yield insights and enable their automatic processing. In this talk we will describe some first-hand experiences with industrial projects within this framework. Our aim is to exemplify the scopes and objectives of data science in industry, and how it can be integrated in the development pipeline of real cases.
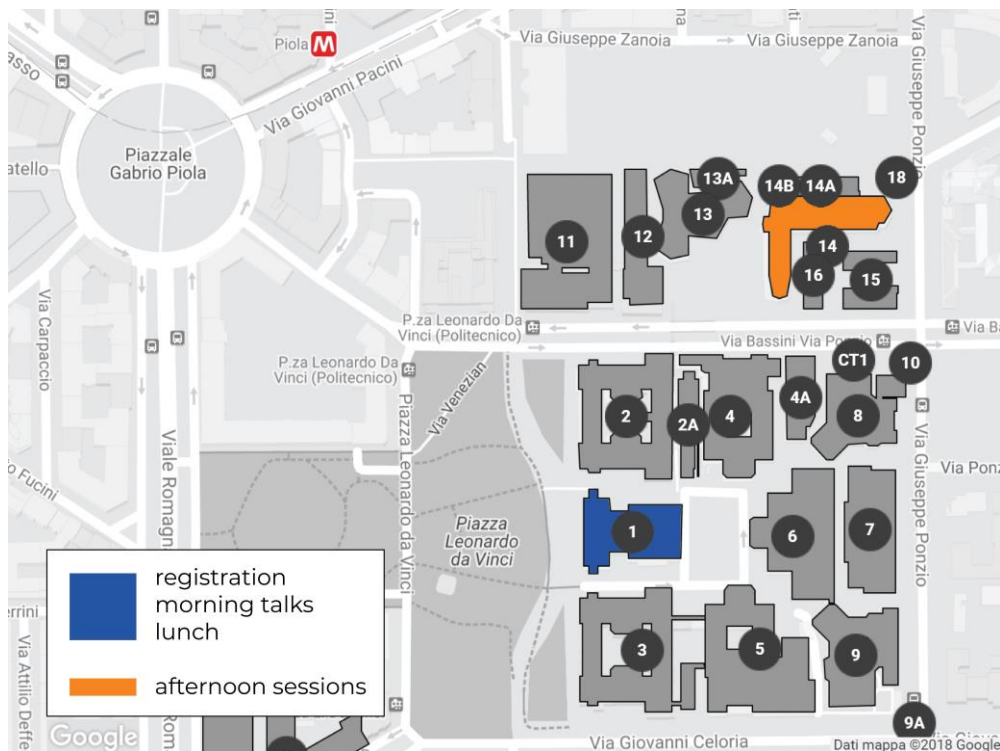
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# MAPS

The registration and the morning talks will be in **Aula Magna**, Piazza Leonardo da Vinci 32, Milano, Edificio 1 "Rettorato", Campus Leonardo del Politecnico di Milano.
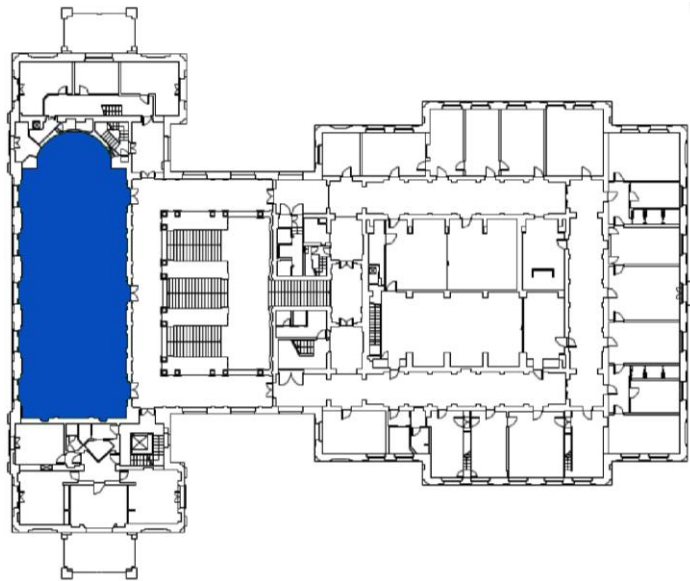
The afternoon sessions will be in the **Department of Mathematics**, Via Bonardi 9, Milano, Edificio 14 "La Nave", Campus Leonardo del Politecnico di Milano.
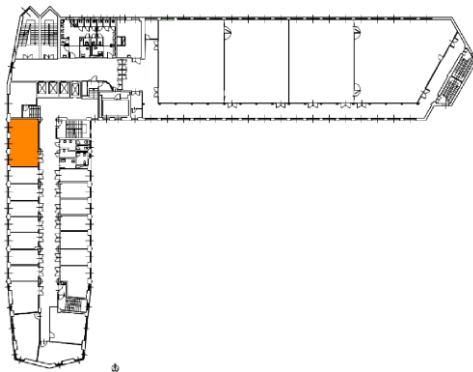


Public transport: metro stop Piola, Line 2 (green).
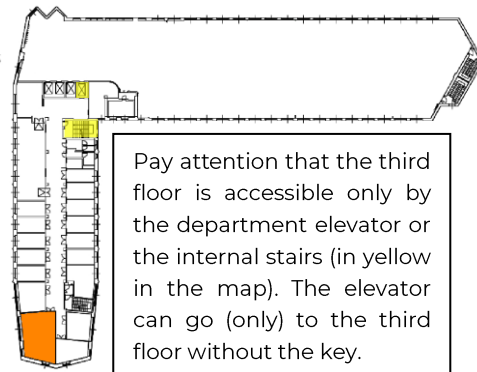
Tram stop n.19 & n.33, filobus n.93.

# The Aula Magna is at the first floor of Edificio 1 - Rettorato
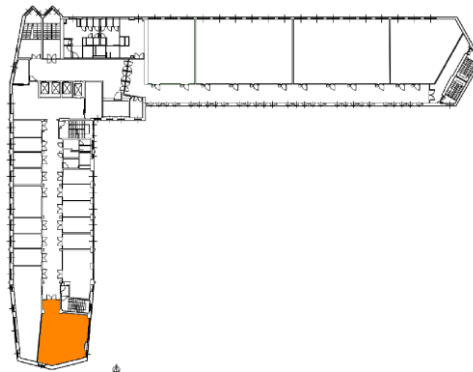


## 2° floor – Math & Coffee



## 3° floor – Aula Seminari



Pay attention that the third floor is accessible only by the department elevator or the internal stairs (in yellow in the map). The elevator can go (only) to the third floor without the key.

## 6° floor – Aula Seminari



## 7° floor – Sala Consiglio