



# TALK ANNOUNCEMENT: RECENT ADVANCES IN ERP ESTIMATION AND CLASSIFICATION

3<sup>RD</sup> OF JULY 2015 AT 11.00  
3H ROOM – SCHOOL OF PSYCHOLOGY –  
VIA VENEZIA, 12 – PADOVA (IT)

FREE ADMISSION

DR. MARCO CONGEDO, RESEARCH SCIENTIST, GIPSA-LAB, CNRS  
& GRENoble UNIVERSITY, GRENoble, FRANCE

ABSTRACT: EVENT-RELATED POTENTIALS (ERP) ARE A FUNDAMENTAL PARADIGM FOR THE STUDY NORMAL AND ABNORMAL HUMAN BRAIN FUNCTION BY MEANS OF ELECTROENCEPHALOGRAPHY. WE WILL CONSIDER TWO RECENT ADVANCES FOR THE ESTIMATION OF ERP ENSEMBLE AVERAGE AND FOR SINGLE-TRIAL ERP CLASSIFICATION IN THE PRESENCE OF NOISE AND ARTEFACTS. FOR THE ENSEMBLE AVERAGE ESTIMATION WE WILL DESCRIBE A MULTIVARIATE SPATIO-TEMPORAL FILTER MAXIMIZING THE SIGNAL-TO-NOISE RATIO OF THE PHASE-LOCKED COMPONENTS OF THE ERP. THE METHOD TAKES INTO CONSIDERATION THE TRIAL-TO-TRIAL VARIABILITY IN ERP AMPLITUDE AND LATENCY AS WELL AS THE OCCURRENCE OF ERP RESPONSES OVERLAPPING IN TIME. FOR SINGLE-TRIAL CLASSIFICATION WE WILL PRESENT AN APPROACH BASED ON THE RIEMANNIAN GEOMETRY IN THE MANIFOLD OF SYMMETRIC POSITIVE DEFINITE MATRICES, WITH APPLICATION IN BRAIN-COMPUTER INTERFACES. THE APPROACH IS AT THE SAME TIME SIMPLE AND POWERFUL, AS IT HAS BEEN DEMONSTRATED RECENTLY BY ITS OUTSTANDING PERFORMANCE IN INTERNATIONAL MACHINE LEARNING COMPETITIONS.

LOCAL PROPONENT: LIVIO FINOS (LIVIO.FINOS@UNIPD.IT)

The Riemannian Manifold  
of Symmetric Positive Definite Matrices

