

## Allegato A PROGETTO Scienza senza Frontiere – Brasile

### Name of the doctoral program

PHYSICS

Full degree x Cotutelle x

### Title of the research activity

INFLUENCE OF IONS AND IMPURITIES IN THE ELECTRIC PROPERTIES OF GELS, SOLUTIONS AND LIQUID CRYSTALS

### Short description of the research activity

It is proposed an experimental and theoretical work aiming to describe the electric response of media containing ions or impurities (gels, solutions, polymers, liquid crystals etc.). The PhD student will be involved in studying effects due to:

- i) anomalous/ambipolar diffusion
- ii) non perfect behavior of electrodes, e.g. 3-D effects and transport processes at the electrode
- iii) frequency dependence of the diffusion or dielectric properties
- iv) hysteretic effects in the response of the system to an electric field

Experimental work will be conducted and models derived. Numerical work will be done, using both theoretical approaches (Mathematica) or simulations (C and C++).

Applications of the obtained results in fields such as biomedicine will also be considered.

### Scientific responsible (name, surname, role)

PROF. GIOVANNI BARBERO (FULL PROFESSOR)

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DR. MARCO SCALERANDI (RESEARCHER)

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### Number of vacancies for XXVIII cycle (begin January 2013)

1

### Specific requirements (experiences, skills)

- 1) Computational: basic knowledge of C and MatLab
- 2) Experimental: interest and basic skills in experimental work
- 3) Modeling: advanced knowledge in electromagnetism, diffusion processes and basic mathematical skills

### Website of the research group (if any)