PhD project in ASTROPHYSICS
(One page)

Title of the Project: Searching for water on Mars: global mapping of the dielectric properties at the base of the Martian polar caps

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Scientific Case: After the identification of the presence of liquid water under the southern polar cap of Mars, starting from the data of the MARSIS orbital radar on board the European probe Mars Express, the quantitative analysis of the observations of this experiment in other areas of the planet has become a high-priority scientific goal. The amount of data and the need to extract information from them using semi-automatic techniques make the task challenging, but they form the basis for a complete mapping of the areas potentially containing liquid water below the Martian polar ice caps.

Outline of the Project: The development of methods for the inversion of the signal to identify the presence of water will eventually lead to a global understanding of its origin, of the mechanisms that allow its existence and of its role in constituting a possible habitat for any primitive life forms on Mars. The candidate should be interested in the study and modeling of electromagnetic propagation, in the implementation of numerical simulations and methods for radio signal analysis, and should have at least basic skills in numerical programming languages (Matlab, IDL, etc.) A knowledge of methods for statistical inference and for programming machines for parallel computing is a preferential title.

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