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From 04/03/2016 till 09/02/2016 I was visiting Scuola Internazionale Superiore di Studi Avanzati (SISSA, International School of Advanced Studies) in Trieste, Italy. Under supervision of professor Massimo Capone from Condensed Matter Theory Sector I improved my abilities on performing theoretical calculations on strongly correlated electron systems mainly focused on dynamical mean field theory and local impurity self-consistent approximations.

During my stay firstly, we discussed the details of the dynamical mean-field approximation. This treatment involves advanced numerical methods and gives quite good explanation of the experimental results for strongly correlated systems, particularly in the neighborhood of Mott metal-insulator transition. The main task was to calculate dynamical quantities, e.g., density of states as a function of the energy for interacting system and quasiparticles residues. After discussion on the applications and limitations of the method we turned to numerical calculations. We obtained the characteristics for the Fermi liquid and Mott insulating phases in the Hubbard model. We also derived the results for the phases with long-range magnetic orders. Next, we applied the method for the extended Hubbard model taking into account the possibility of an occurrence of a charge-order phenomena in paramagnetic phases. Lastly, we discussed the recent development of extended dynamical mean-field approximations and possible paths for new researches particularly focusing on phases with long-range order in the presence of long-range interactions.

My visit to SISSA was very satisfying and fruitful, as I significantly improved my skills in theory of strongly correlated electron system and I was instructed on recent developments concerning the issues of great interest to me. The choice of the host institution played a significant role as a place of excellence in research, teaching, and education, providing a stimulating environment. The research stay resulted in considerable research output in the form of publications, which will be finalized and submitted towards the end of this year. Finally, thanks to ERASMUS programme I developed new relationships with SISSA workers. I would like to thank prof. dr. Massimo Capone and dr. Adriano Amaricci for assistance during my stay at SISSA.