

PLASMASURF

2018



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Plasmasurf is a summer school on plasma physics, intense lasers and nuclear fusion that aims to introduce you these topics or in case of you are already well-versed to improve your knowledge in them. Moreover, it is a great opportunity to meet brilliant people, and enjoy outdoor activities .

We arrived to Lisbon on a sunny day when the summer school started with the team building activities made us a cohesive team in the end. After having a hearty dinner, we attended a lecture about the physics of waves and the parameters defining their surfing quality.

In the evening we enjoyed cheese and wine party full of laughter and positive mood.



Monday we started with professor Vasco Guerra's lesson which introduced us to plasma physics by giving the definition of plasma, elucidating the plasma parameters such as plasma frequency and Debye length, showing us different approaches to study plasmas. After that professor Jorge Vieira taught us computational physics where he showed challenges in plasma modelling and the hierarchy of plasma models. That evening we went to Cascais where we competed in kayaking race, played volleyball, swam in a refreshing dip of the ocean.

On Tuesday professor J.P Bizarro instructed us magnetic nuclear fusion, described its advantages and unsolved problems. He explained us why deuterium-tritium is the preferred reaction and the reasons behind tokamak and stellarator geometries. Then researcher Marija Vranic expounded upon inertial confinement fusion, the strengths and the weaknesses of direct and indirect drive, parametric instabilities of plasma in inertial fusion confinement.



That afternoon we visited remarkable IST laboratories in Lisbon, where VOXEL (Volumetric medical X-ray imaging at extremely low dose) experiments with lasers were showed. As main course we were able to visit ISTTOK Tokamak guided by professor Horacio Fernandes, where we became aware of main parameters of the tokamak, diagnostic systems and data acquisition. After having visited laboratories, we had an amazing walking tour in Lisbon listening to its rich history. Day finished with a social dinner in a Lisbon restaurant.



On wednesday professor Paulo Rodrigues lectured on kinetic and MHD description of a plasma. He told us about distribution function and its moments, explained how we can obtain the equations of hydrodynamics from Vlasov equation, special attention was paid to MHD equilibrium.

Then researcher Mario Lino da Silva expounded us about space plasma. He told about plasmas engine which are used on spacecrafts for orbit correction, atmospheric entry plasma. After lunch professor Rui Coelho told us about signal analysis. He explained how we can do interpolation and curve fitting, talked about the problems that may arise in the analysis of signals. Closed our day with a rock climbing lesson, and it was very cool.





On Thursday the director of IPFN Bruno Gonçalves gave us an interesting lecture about ITER describing its parts, materials, characteristics and similarities with JET and other tokamaks. Also he described the expected results for ITER in the next years. After that, Celso Joao talked us about lasers, how they work and what applications they have depending of his characteristics. He also described one of the biggest laser installations: NIF. On the afternoon João Loureiro and Horácio Fernandes introduced us to e-lab platform which allows scientists to do remote experiments operation, and taught us how to make the Langmuir's probe experiment. We closed the day having a fun evening learning how to do surf in a beautiful beach.

Friday was our last day, and in the morning we had an interesting plasma technologies for material processing, where we were told about gas discharges and plasma reactors. In the afternoon we analysed the data obtained from e-lab, specifically on Langmuir's probe experiment. In the evening we made a fun activity, learning how to ride mountain board in the mountains of Sintra, so we had a rush of adrenaline.

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In the end we had a farewell party, having dinner in a restaurant decorated in a peculiar way, there we enjoyed a lot, sharing our last dinner together. After dinner some of us went to Lisbon to party. The worst part of Plasmasurf 2018 was saying good bye to all the friends we had made during the week.