

## **SURVIVING IN THE TOKAMAK HEAT**

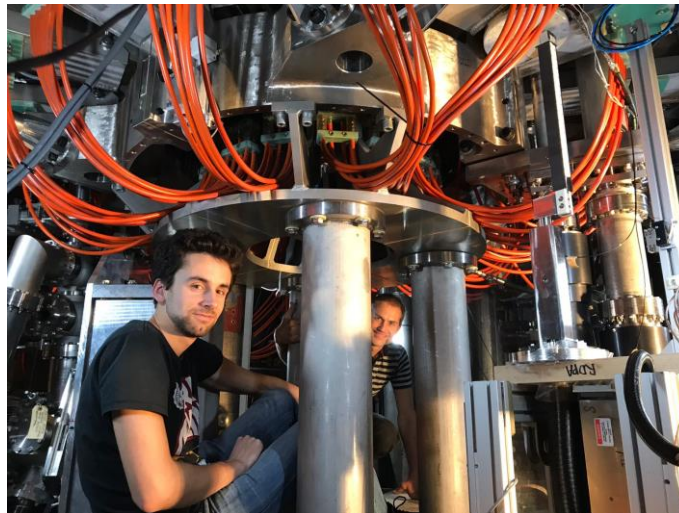
**This video will present the recently built fast divertor probe at TCV from the construction phase to the experimental plasma discharges.**

### **BEGINNING OF A PHD ADVENTURE**

Christian Theiler proposed me an ambitious PHD thesis subject in October 2016: to build and operate a fast divertor probe in the TCV divertor in order to scan a 2D region of the plasma, what would become the Reciprocating Divertor Probe Array (RDPA) diagnostic. The design evolved days after days. We could benefit from the advices of internal experts, such as Cedric Tsui and René Chavan, as well as external experts, such as Bryan LaBombard, Dan Brunner and Richard Pitts. In September 2017, Hammam Elaïan joined the Swiss Plasma Center as an engineer and started to design and draw all the diagnostic parts. In December 2018, the diagnostic was finally tested. 15 successful discharges were obtained in the very last day before the Christmas holidays. The Langmuir probe measurements were reliable and plasma profiles could be successfully reconstructed. More details about the results and the physics will be presented in the 4 pages paper for the 2019 EPS conference.

### **SURVIVING IN THE TOKAMAK HEAT**

The heat flux near the separatrix can exceed  $15\text{MW/m}^2$  in TCV. No material can withstand such a heat flux in steady state. Therefore, a fast motion is required in order to keep the material surface (graphite) below  $\sim 1500$  Celsius. Controlling the surface temperature is important to minimize sputtering rates and to reduce the likelihood of probe tips arcing (large electron emission from the surface). Due to the large probe size and stiffness requirements, the probe moving part became heavier ( $\sim 20\text{kg}$ ) than most fast scanning probes operating in other tokamaks. The linear motor with the largest force available in the market was purchased in order to maintain the speed ( $2.5\text{m/s}$ ) and the acceleration ( $80\text{m/s}^2$ ) requirements. The following picture is taken under TCV during the probe installation (RDPA is on the top right of the image).



### **REFERENCES**

Publications about RDPA are not yet available.

A paper describing the system will be submitted to Review of Scientific Instrument in the future.

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### **AUTHORS & CONTACT INFORMATION**

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