Dr. Leonardo Pigatto
Curriculum Vitae

Corso Stati Uniti, 4, 35127, Padova, Italy
0039 049 829 5014
leonardo.pigatto@igi.cnr.it
https://github.com/pigattol

RESEARCH AREA

My main research area is that of stability and control of Magnetohydrodynamic (MHD) global instabilities in fusion relevant plasmas. Ranging from real-time control of the magnetic boundary to the physical mechanisms that trigger and affect the most disruptive plasma instabilities. Understanding the interaction between the plasma and 3-dimensional electromagnetic boundaries is a key topic to achieve stable operation of a fusion experiment. On the RFX-mod device this electromagnetic boundary can be fine tuned thanks to a state-of-the-art active coil system. Some specific topics I have addressed are: multi-modal RWM control with varying coil number and geometry, improvement of the vacuum magnetic field spectrum through actuator decoupling, compensation of broken or deactivated coils with simple and real-time applicable strategies. Another aspect of my work deals with the stability properties of Advanced Tokamak scenarios, with reference to the JT-60SA experiment in particular (Naka, Japan). I carry out studies to understand RWM physics in high pressure plasmas with the MARS-F/K linear MHD codes. In particular, I investigate the physical mechanisms that can lead to stabilization of global MHD modes, usually through mode-particle interactions. Linear MHD stability is also useful when coupled with external control fields to assess the so-called *plasma response* to such perturbations. This response can be used to optimize control strategies that imply the use of external coils. An important application of such strategies is that of correcting error fields that alter the magnetic configuration.

CONFERENCES AND WORKSHOPS

CONFERENCES	Oral Presentation at the 22nd Workshop on MHD Stability Control (Invited) American Physical Society – 2017
POSTERS	2014 – 41st EPS Conference on Plasma Physics
	2014 – 28th Symposium on Fusion Technology
	2015 – 597th Wilhelm and Else Heraeus Seminar
	2014 – 20th IEEE – NPSS Real Time Conference
	2016 – 43rd EPS Conference on Plasma Physics
	2018 – IAEA Fusion Energy Conference
	2019 – 46th EPS Conference on Plasma Physics

PUBLICATIONS

Bolzonella, T., Baruzzo, M., Liu, Y., Marchiori, G., Matsunaga, G., **Pigatto, L.**, Soppelsa, A., Takechi, M., Villone, F. (2014). Physics and control of external kink instabilities with realistic 3D boundaries: A challenge for modern experiments and modeling, Plasma and Fusion Research, vol. 9.

Pigatto, L., Bettini, P., Bolzonella, T., Marchiori, G., Villone, F. (2015). Optimal strategies for real-time sparse actuator compensation in RFX-mod MHD control operations, Fusion Engineering and Design, *96-97*: 690-693.

Pigatto, L., Baruzzo, M., Bettini, P., Bolzonella, T., Manduchi, G., Marchiori, G. (2017). Control system optimization techniques for real-time applications in fusion plasmas: the RFX-mod experience, IEEE – Transactions on Nuclear Science,*64.6*: 1420-1425

Giruzzi, G., et al. (2017). Physics and operation oriented activities in preparation of the JT-60SA tokamak exploitation Nuclear Fusion *57(8)*: 085001.

Romanelli, M., et al. (2017). Investigation of sustainable high-β scenarios in the JT-60SA C-wall. Nuclear Fusion *57(11)*: 116010.

Piron, C., et al. (2019). Extension of the operating space of high-β N fully non-inductive scenarios on TCV using neutral beam injection. Nuclear Fusion *59*: 096012

Giruzzi, G., et al. (2019). Advances in the physics studies for the JT-60SA tokamak exploitation and research plan. Plasma Physics and Controlled Fusion *62(1)*: 014009.

Pigatto, L., Aiba, N., Bolzonella, T., Hayashi, N., Honda, M., Liu, Y.Q., Marchiori, G., Mastrostefano, S., Matsunaga, G., Takechi, M. and Villone, F. (2019). Resistive wall mode physics and control challenges in JT-60SA high β_N scenarios. Nuclear Fusion, *59(10)*: 106028.

Bonotto, M., Liu, Y.Q., Villone, F., **Pigatto, L.**, Bettini, P. (2020). Expanded capabilities of the CarMa code in modeling resistive wall mode dynamics with 3-D conductors. Plasma Physics and Controlled Fusion, *62(4)*: 045016.