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## Re-commissioning of the Spherical Tokamak MEDUSA in Costa Rica

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The low aspect ratio spherical tokamak (ST) MEDUSA (Madison EDUcation Small Aspect.ratio tokamak) is currently being re-commissioned in Costa Rica and was donation to Costa Rica Institute of Tecnology by University of Wisconsin-Madison, USA. The major characteristics of this device are [1]: plasma major radius  $R_o < 0.14\text{m}$ , plasma minor radius  $a < 0.10\text{m}$ , plasma vertical elongation 1.2, toroidal field at the geometric center of the vessel  $B_T < 0.5\text{T}$ , plasma current  $I_p < 40\text{kA}$ ,  $n_e(0) < 2 \times 10^{20}\text{m}^{-3}$ , central electron temperature  $T_e(0) < 140\text{eV}$ , discharge duration is  $< 3\text{ms}$ , top and bottom rail limiters, natural divertor D-shaped ohmic plasmas). In addition to training, the major objective of renamed device MEDUSA-CR is to address relevant physics for spherical and conventional tokamaks, taking advantage of the insulating vessel which allows plasma real time response to applied external electrical or magnetic fields.

The major topics for the scientific programme are 1) Comparative studies of equilibrium and stability between natural divertor D and bean-shaped ST plasmas [2]; 2) Study of an ergodic magnetic limiter [2,3,4]; 3) Alfvén wave heating and current drive and; 4) Transport. Advances in some of these topics will be presented in this work, in addition to the technical tasks of machine re-commissioning involving the re-design of energy, gas injection, vacuum system and control systems.

### References

[1] G. D. Garstka, PhD thesis, University of Wisconsin at Madison, September 1997. [2] C. Ribeiro et al., Proc. 25th Symposium on Fus. Eng., San Francisco, US, June 2013. [3] C. Ribeiro et al., Proc. 39th EPS Conf. Contr. Fusion and Plasma Phys., vol. 36F, P1.091, Stockholm, Sweden, July 2012. [4] J. J. E. Herrera-Velázquez, E. C. Alarcon, and C. Ribeiro, 24 th IAEA Fusion Energy Conference, TH-p2-28, San Diego, US, 8-12 October 2012.

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