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CFETR- New Design and R&D Activities

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Roadmap of MFE research in China has been discussed by MF research community after CN joint ITER. The most consensus conclusion is showed in figure 1. The key step after ITER for FE development in China is CFETR. It will be the next key device for CN MFE program and will aims to bridge the gaps between ITER and the demonstration reactor DEMO.

Mission and objectives of CFETR: 1) a good complementarities with ITER; 2) demonstration of full cycle of fusion energy; 3) demonstration of full cycle of T with TBR over 1.0; 4) long pulse or steady-state operation with duty cycle 0.3 ˜ 0.5; 5) develop the new advanced technologies such as diagnostics/control for burning plasma, CW H&CD, materials, RH etc for DEMO.

Status of CFETR project: 1) the first concept design has been completed; 2) a new design is under developing; 3) some important R&D supported by different channels has made important progress; 4) further budget support for engineering design and R&D activities will be provided by government soon possibly.

- Both first design and the new design will aim to operate in two phases. Steady-state operation and tritium self-sustainment will be two key issues for the first phase with a modest fusion power up to200 MW. The second phase aims validation for DEMO with a FP over 1 GW.
- Advanced H-mode physics, higher TF magnetic fields up to 7T, CS coil up to 14 T, larger size (R, a/b), less number of TF magnets for higher accessibility, high frequency ECRH & LHCD together with off-axis negative-ion neutral beam injection will be used for achieving steady-state advanced 1 GW fusion power operation for the new design. The more detailed design information and new R&D activities will be introduced in the paper.

Further efforts and challenges: CFETR should get financial support for two phases respectively:

- The budget for engineering design and some R&D have been approved;
- To be approved for CFETR construction by government will be a great challenge and further significant efforts will be needed.
- Wide international exchanges and collaborations will be promoted and welcome !

Figure 1: Roadmap of CN MFE research

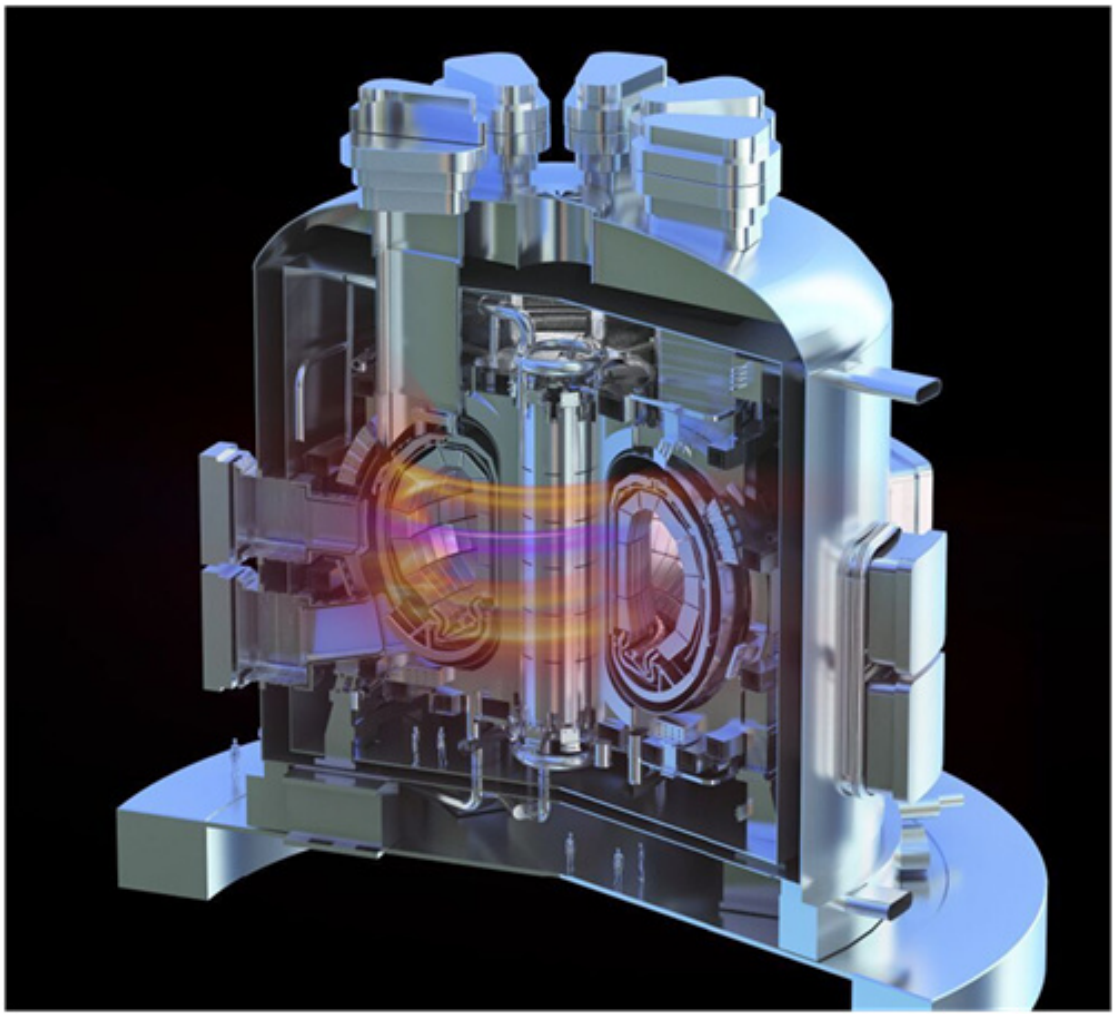

Figure 2: First design version of CFETR

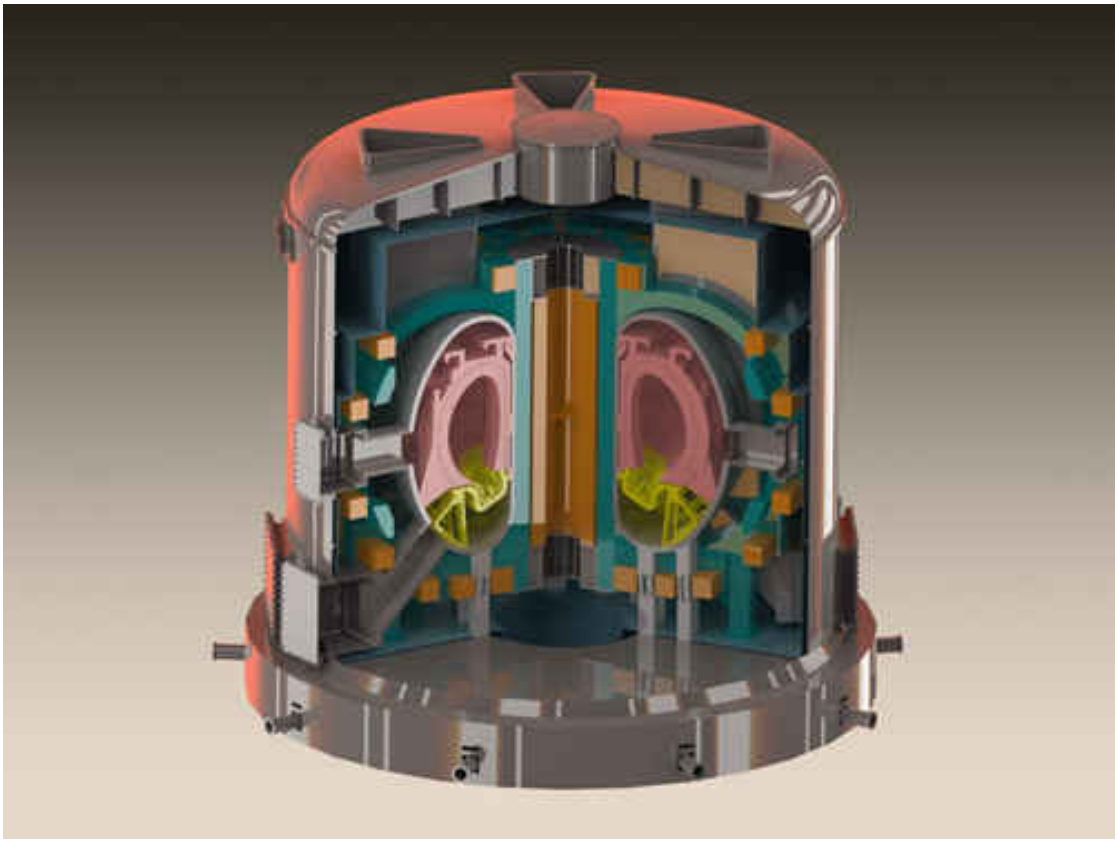

Figure 3: New design version of CFETR

Reference:

[1] Wan Y.X, Li J. Liu Y. Wang X.L and CFETR team “Overview of the Present Progresses and Activities on the Chinese Fusion Engineering Test Reactor”26th IAEA 2016 FEC OV-3

[2] Wan B.N, et al “Physics Design of CFETR: Determination of the Device Engineering Parameters”IEEE Transactions on plasma science, vol. 42, No. 3, March 2014

Eligible for student paper award?

No

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