

## IAF SPACE PROPULSION SYMPOSIUM (C4)

## Liquid Propulsion (1) (1)

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## HYPROB LOX/LCH4 DEMONSTRATOR ACHIEVEMENTS AND FUTURE PERSPECTIVES

**Abstract**

The Italian Aerospace Research Center (CIRA) leads the HYPROB Program, promoted and funded by the Italian Ministry of University and Research (MUR) in order to improve the National background on rocket engine systems for future space applications. A particular attention is paid on LOX/LCH4 propulsion technology in coherence with the long-term vision of the Italian Space Agency on Space Propulsion (ASI). The final objective is to design, manufacture and test a regenerative LOX/LCH4 LRE demonstrator, with the main scope of validating critical design and technology features and then to assess technology readiness level of potential solutions for future engines. The design approach has been defined in order to proceed step by step, by means of simpler technological breadboards, allowing to address and verify the main critical design issues. So far some intermediate technological breadboards have already been developed, manufactured and tested, in particular the Methane Thermal Properties (MTP) breadboard, the GOx-GCH4 igniter and the sub-scale single-injector combustion (SSBB) breadboard. A parallel numerical rebuilding activity has been performed in order to consolidate the models, adopted to consolidate the final demonstrator design. The demonstrator has been realized by means of conventional and special technological methods, like the electrodeposition of copper and nickel. It has passed the acceptance tests, including leak and proof test up to 100 bar. Its water-cooled cooled version is ready to be tested in a dedicated firing campaign at AVIO-Colleferro facility. The present paper reports the recent achievements and results from test campaign, conducted by the Italian Aerospace Research Center in the framework of the HYPROB Program System Line, named HYPROB-BREAD.