Experimental study of Large-scale cryogenic Pulsating Heat Pipes
Maria Barba, Romain Bruce, Antoine Bonelli, Bertrand Baudouy
CEA Paris - Saclay, IRFU/DACM, 91191 Gif-sur-Yvette, France

Presented at the CEC / ICMC 2017, Madison, Wisconsin, USA, 2017 July 9 – 13

European Union’s Seventh Framework Programme (FP7/2007-2013)
Grant agreement nº 313224 - SR2S

Pulsating Heat Pipes
- Pulsating or Oscillating Heat Pipe (PHP or OHP)
- Passive heat transfer device (without pumping system)
- Tube with capillary dimensions and serpentine shape
- At least one heating part and one cooling part
- Temperature and pressure conditions close to phase-change
- Different possible positions of the heating part: bottom-heating mode, top-heating mode and horizontal position

Tests results
PHP with 36 parallel channels (Heat load of 10 W and liquid filling ratio of 33 %)
- Buffer volume connected to the PHP
Results:
- Oscillating phase: 35 min
- Equivalent thermal conductivity: 350-160 kW/m.K
- Buffer volume not used
Results:
- Oscillating phase: 35 min
- Equivalent thermal conductivity: 290-190 kW/m.K

Application
To cool down a superconducting toroid magnet (10 m long and 12 m of diameter) to protect the human habitat from the ionizing radiations during long term missions in deep space. (SR2S European project)