DCP WP3
-
First thermo-siphon workshop

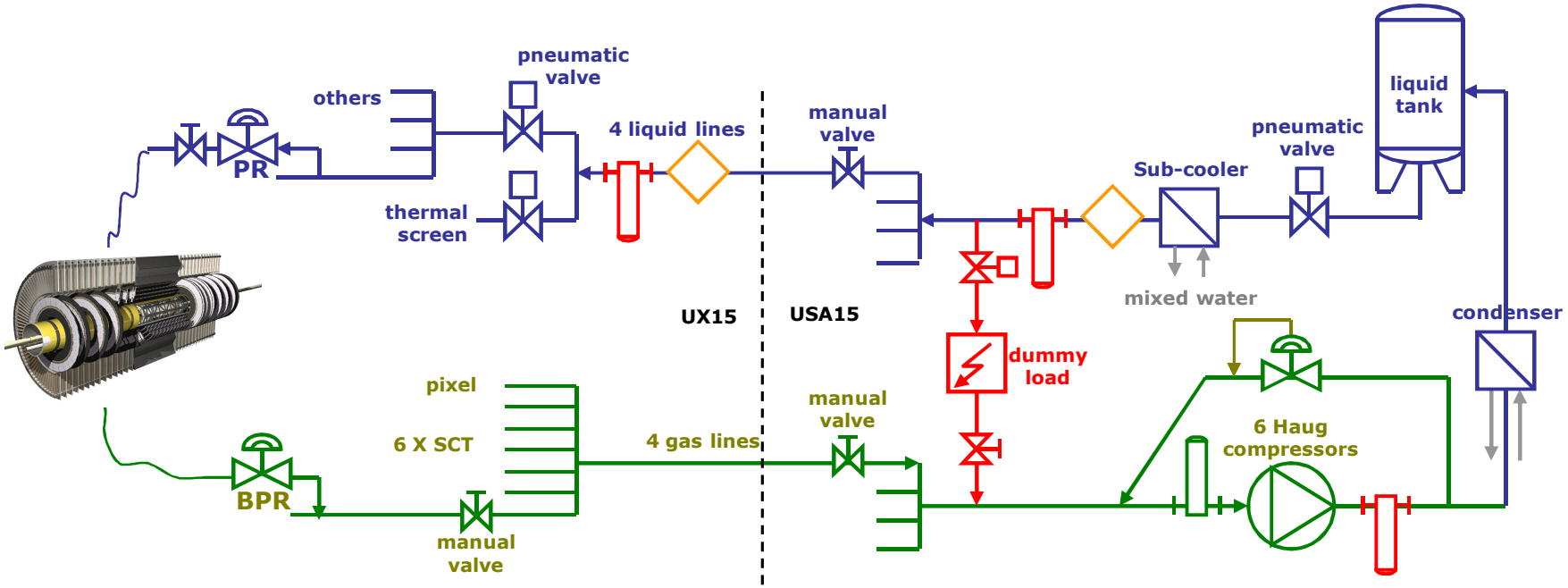
M. Battistin (EN/CV/DC)

6th July 2009

Moving out from compressors

ATLAS requested to evaluate a possible alternative to the present compressor station. The main reasons are:

- Reliability: many failures registered in the present compressors
- Cleanliness: wear of components oblige to an important filtering process
- Leaks: developing with time due (in part) to vibrations

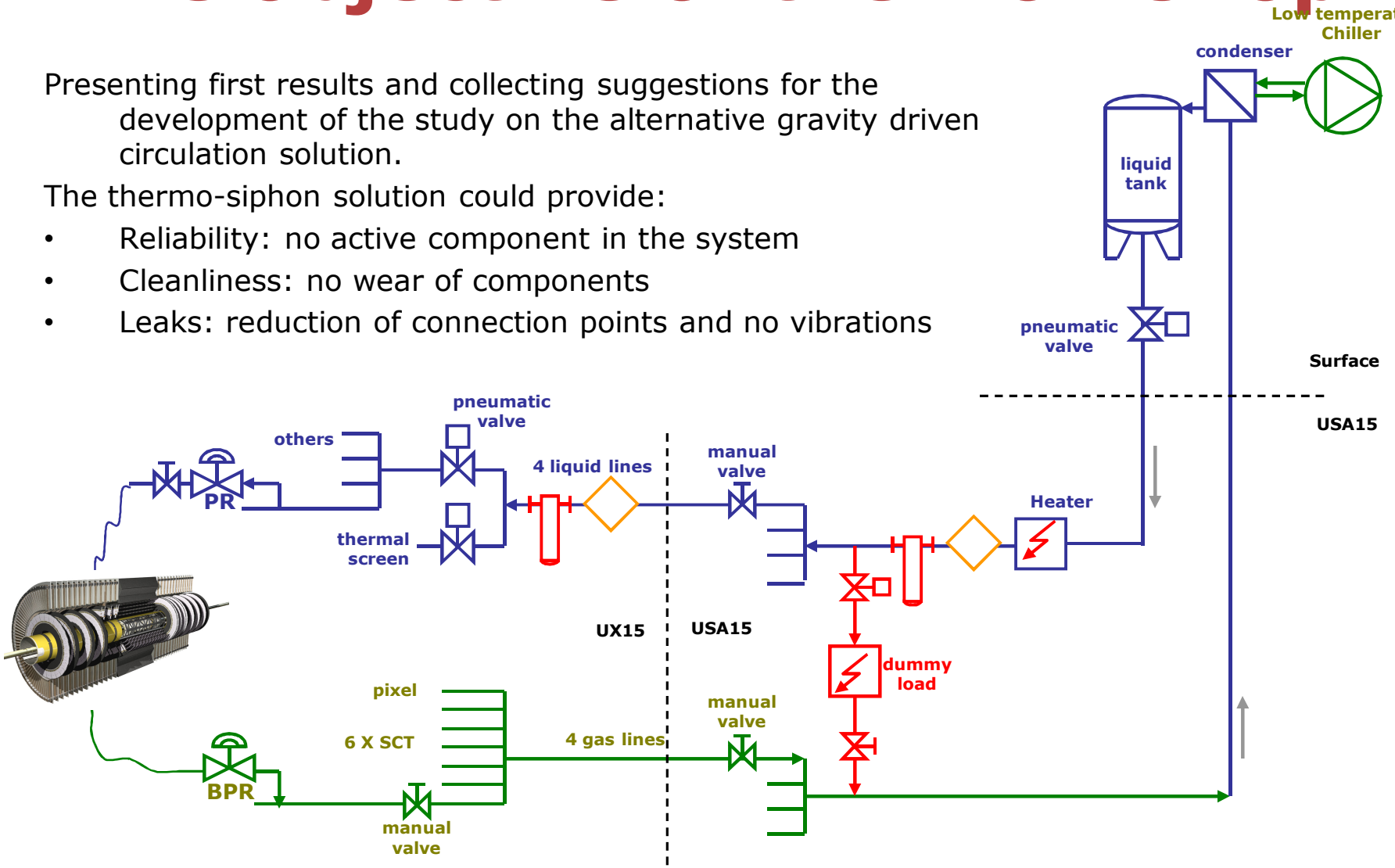


The objective of the workshop

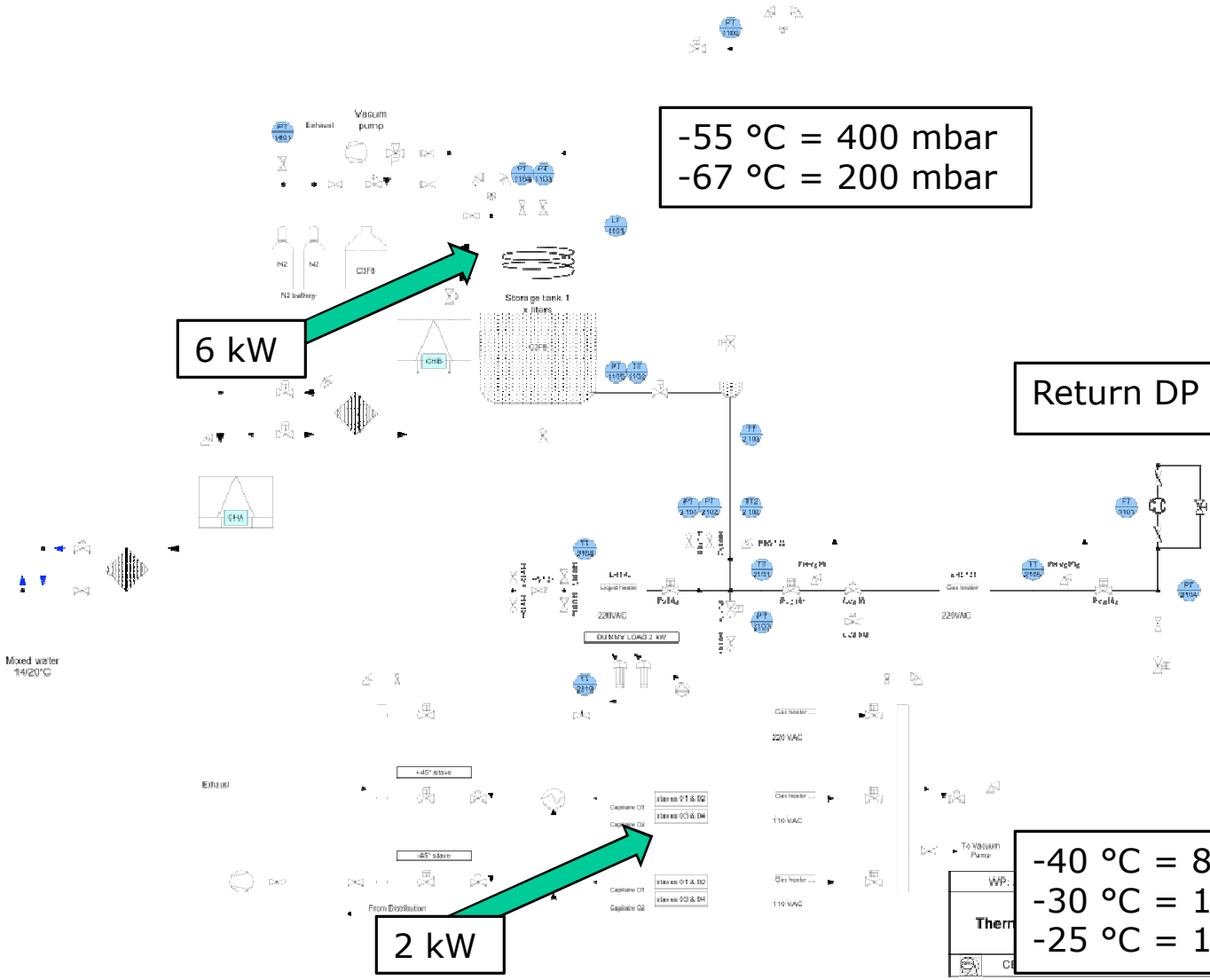
Presenting first results and collecting suggestions for the development of the study on the alternative gravity driven circulation solution.

The thermo-siphon solution could provide:

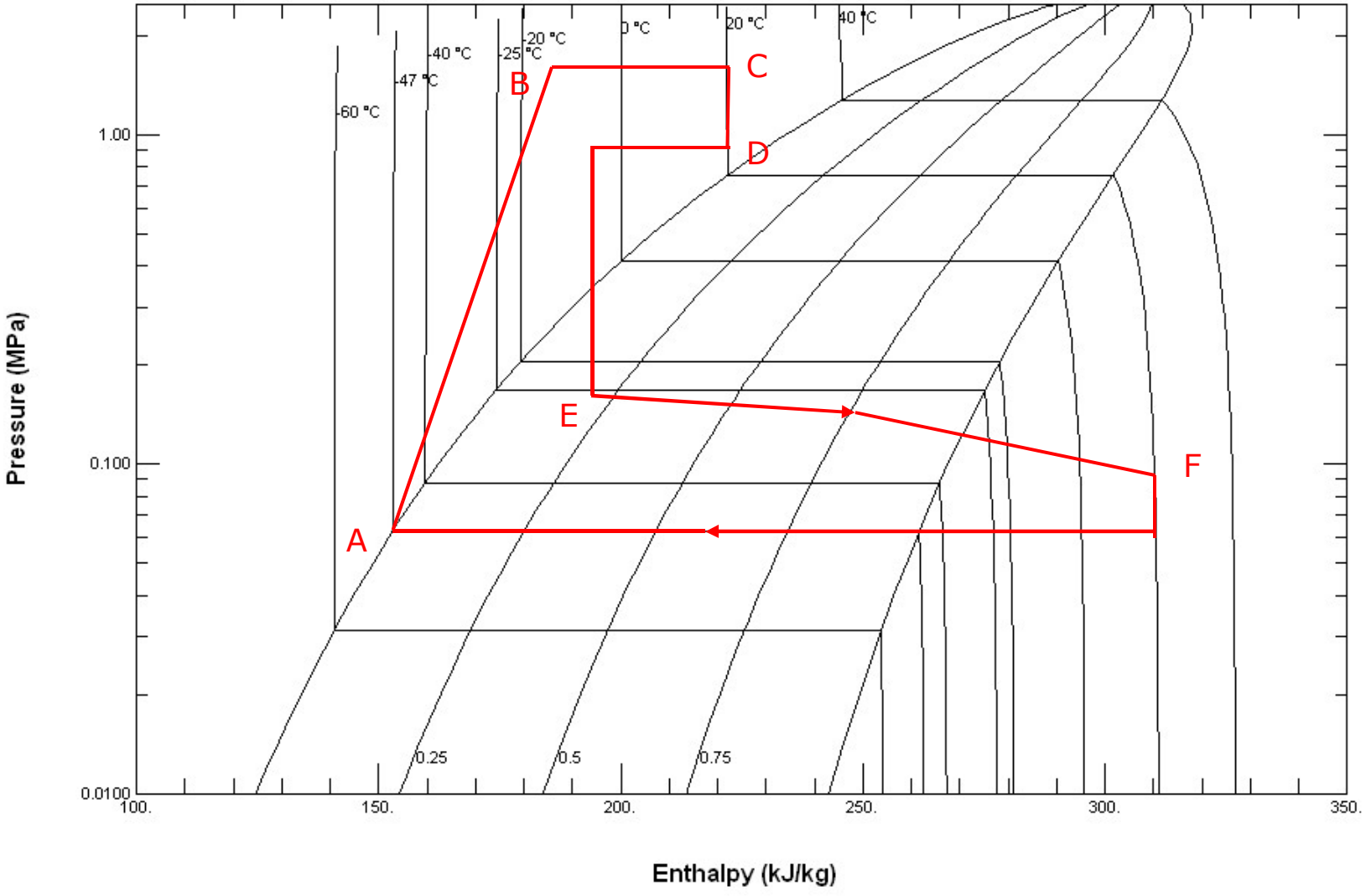
- Reliability: no active component in the system
- Cleanliness: no wear of components
- Leaks: reduction of connection points and no vibrations



P&I of the installation



A low efficiency cycle



The project organization

Alexandre Moraux, Elena Perez, Michele Battistin, Jan Godlewski, Danilo Giugni, Konrad Gugla, Johan Bremer.

Thermo-siphon first Action list:

- First Workshop on thermo-siphon solutions at CERN 6th July 09.
- Technical and economical definition of the low temperature chiller solution – Visit to first possible supplier on June 29th.
- Provisional design of the first prototype – July 09.
- Installation of the transfer lines in the PX15 – August 09.
- Prototype assembly – Sept-Nov 09.
- Commissioning and test – Dec 09-March 10

There is a need/possibility of a fast and intermediate prototype to be installed with recuperation material using an high of 10-20 meters?

Conclusions

- Gravity driven circulation evaporative cooling systems seems a promising technology to replace the compressors in the evaporative cooling systems
- It is foreseen to install a test bench in PX15; the design parameters of this test bench installation fit with ATLAS IBL cooling needs.
- We are evaluating the need to realize a very small scale test bench to validate the first design assumptions
- Perfluorocarbon blends solutions could be adopted to the thermo-siphon to improve the performances. Azeotropicity could be a problem.

Agenda

- 09:00 Introduction and main lines of the projects (CERN) — Michele Battistin
- 09:20 Thermo siphon pre design — Alexandre Moraux
- 09:50 Quality Plan and Project Planning — Elena Perez Rodriguez
- 10:10 Piping integration in PX15 — Alexander Bitadze
- 10:20 coffee break — Gregory Hallewell
- 10:40 Very low condensation temperature chillers solution — Michele Battistin
- 11:00 C3F8 blends (30')
- 11:30 Scalability of the plant form 2 to 70 and finally 180 kW — Jan Godlewski
- 12:00 Risk Analysis (30') — Danilo Giugni
- 12:30 Lunch (1h30')
- 14:00 Process Simulation of the plant (30') — Alexandre Moraux
- 14:30 Variable flow solution (30') — Gregory Hallewell