

# SAES RIAL Vacuum

The power of excellence for your  
atom trap system

The logo consists of a red square containing the text "saes" in white lowercase letters on the top line and "group" in white lowercase letters on the bottom line.

**saes**  
**group**

making **innovation happen**, together

# SAES RIAL Vacuum

- ❑ The Joint venture was established at the end of 2015 with the mission to create a technological and manufacturing pole of the highest level finalized to the design, manufacturing and testing of vacuum systems and integrated components for a variety of research and industrial applications.
- ❑ The company combines the deep knowledge in vacuum and material science of SAES Getters with the expertise in vacuum design and fine machining of RIAL.



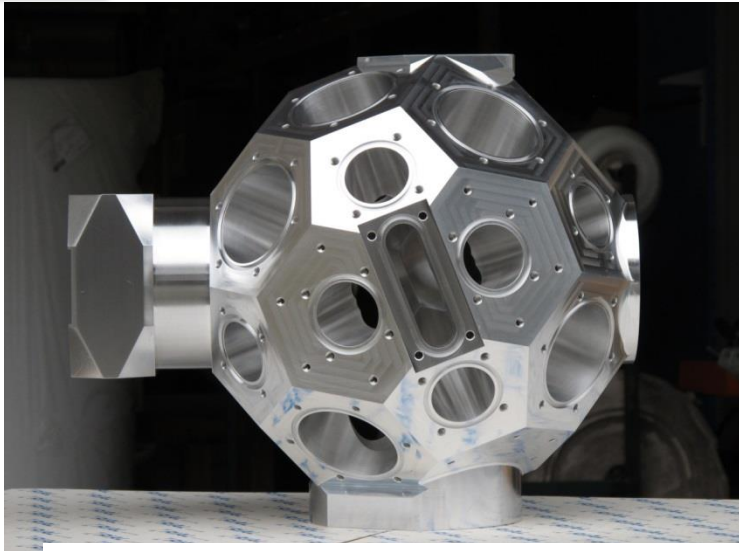
## Specific strength in Atom Trap systems

- ❑ RIAL has been for years a highly reputed supplier of chambers and components for Atom Trap systems.
- ❑ SAES Getters has developed the innovative NEX Torr pump, which is now the new benchmark pump for any type of Atom Trap system.
- ❑ SAES Getters features also the capability of defining the optimal pumping configuration through advanced simulation softwares.

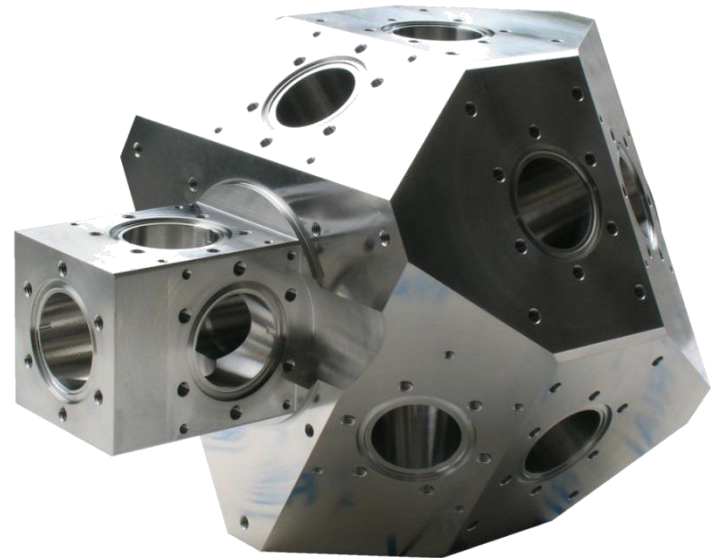


**SAES RIAL Vacuum offers integrated packages for Atom Trap systems consisting of the chambers with tubings and the pumps, properly optimized and designed to reach the targeted UHV Pressure.**

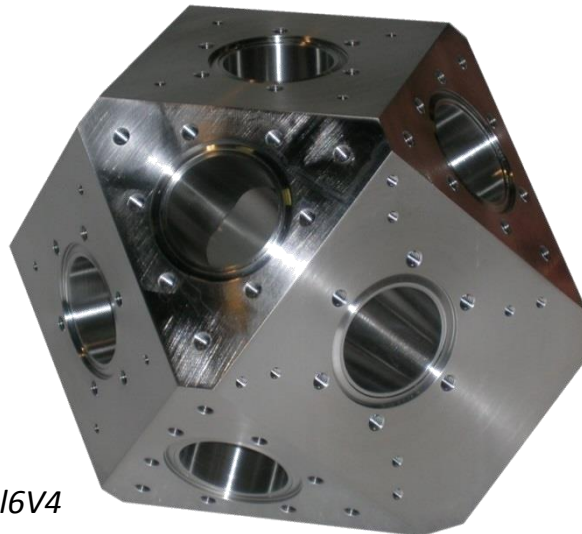
# SAES RIAL: Compact UHV chambers



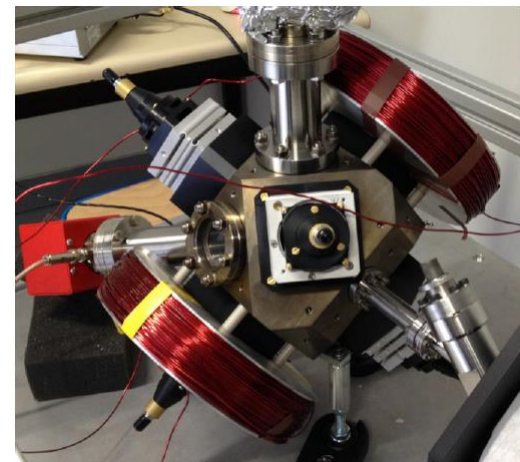
*Truncated icosahedron – Aluminium Al 5083*



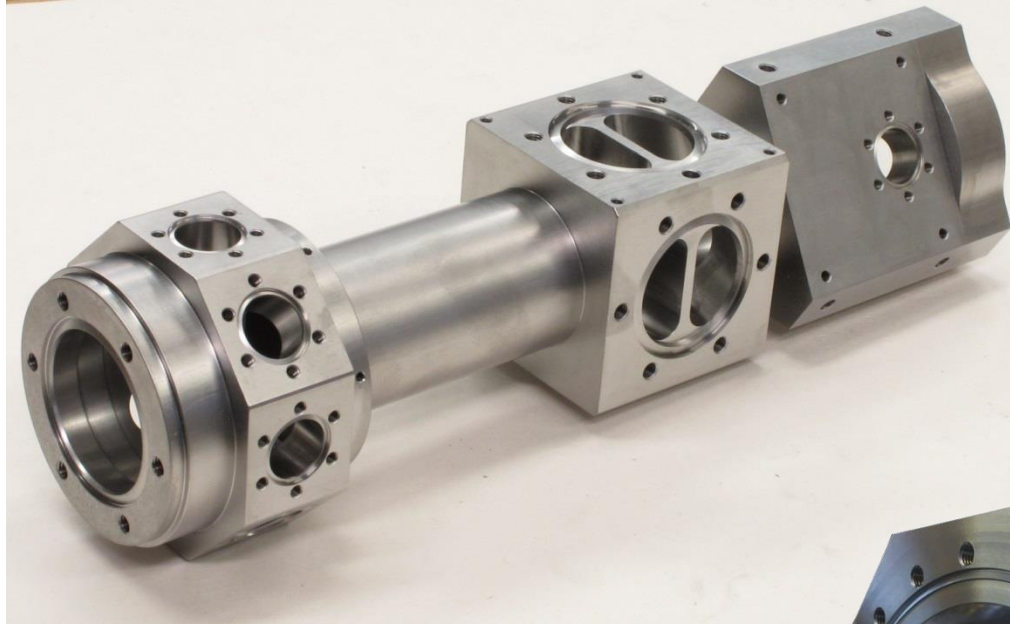
*Spectroscopy chamber BOULE - Forged TiAl6V4*



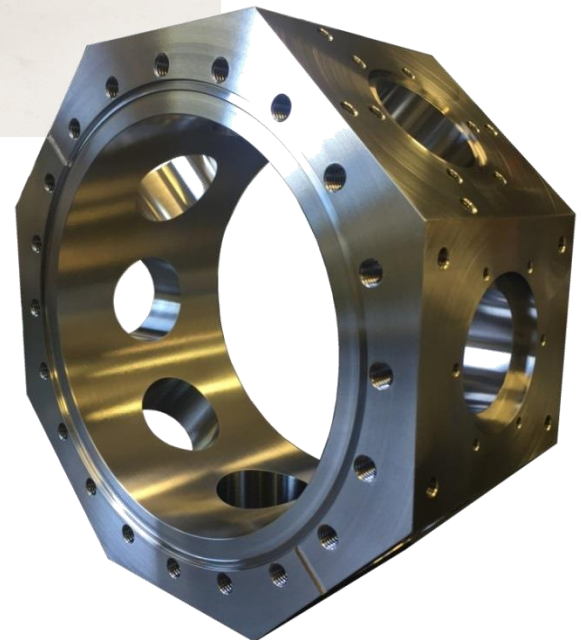
*Titanium BOULE - Forged TiAl6V4*



# SAES RIAL: Compact UHV chambers



*UHV Enceinte - Forged TiAl6V4*





# What is the NEXTorr® pump



- The NEXTorr is a combination of a NEG pump (Non-Evaporable Getter) with a small SIP (Sputter Ion Pump), overall delivering excellent pumping performances for the entire range of gas species
- The NEG element features a terrific performance particularly for H<sub>2</sub>, which is the main residual gas at UHV pressures
- The SIP can efficiently pump Argon and Methane, also providing pressure reading (the lifetime of the trapped atoms is directly proportional to the pressure in the system)
- The NEXTorr is an extremely compact pump: its weight is only 2.2 Kg!



# Why the NEXTorr® pump

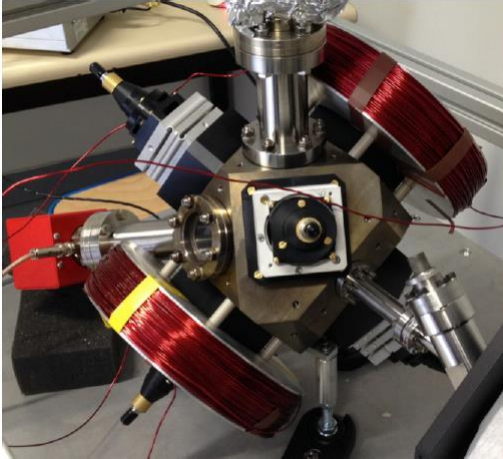
- The NEXTorr is extremely compact, 10 times lighter and smaller than a nominally equivalent SIP pump!
- Space can be saved and can be used for other components (optics, detectors, ...).
- Pressure levels down to the  $10^{-11}$  /  $10^{-12}$  mbar range are achieved and maintained forever.
- The NEG alloy (St-172) is sintered in vacuum for utmost cleanliness, and is amagnetic (magnetic permeability is 1.0001).
- The magnetic field of the Ion element is far smaller than the one of any other commercially available Ion pump (refer to the detailed magnetic characterization of the NEXTorr pump)
- Mu-metal shielding available to further minimize the magnetic interference



The **NEXTorr** is the new benchmark UHV pump for compact Atomic Clocks, Gravimeters, and any Atom/Ion Trap experiments

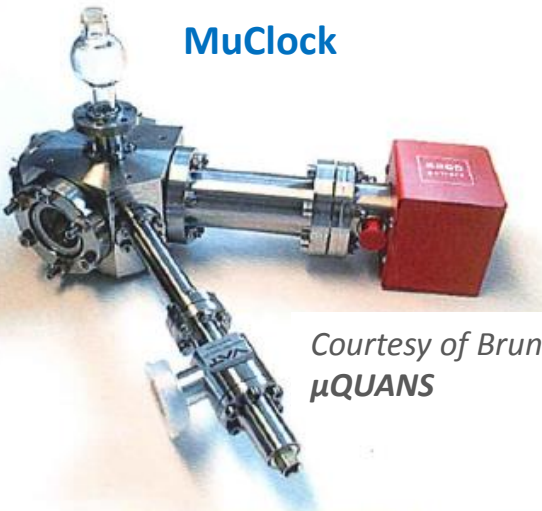
# Examples of SAES-RIAL integrated systems

Rb 3D MOT

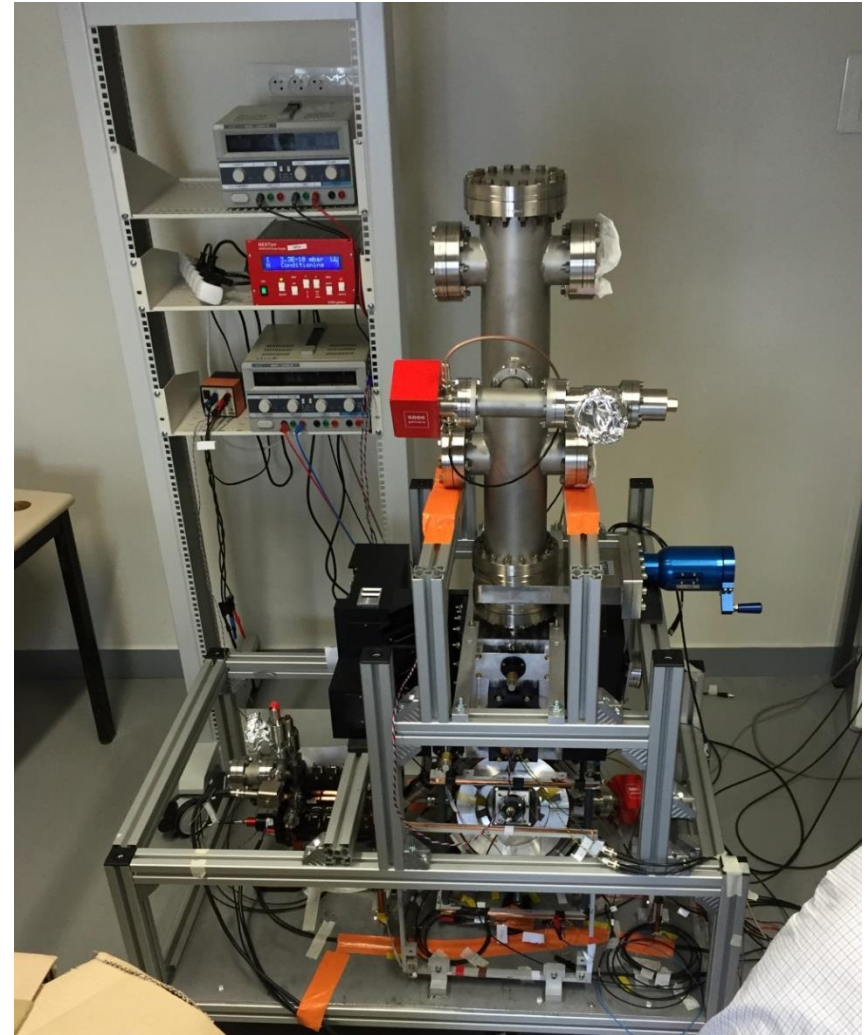


Courtesy of B. Canuel, *Institute d'Optique*

MuClock



Courtesy of Bruno Desruelle,  
*μQUANS*



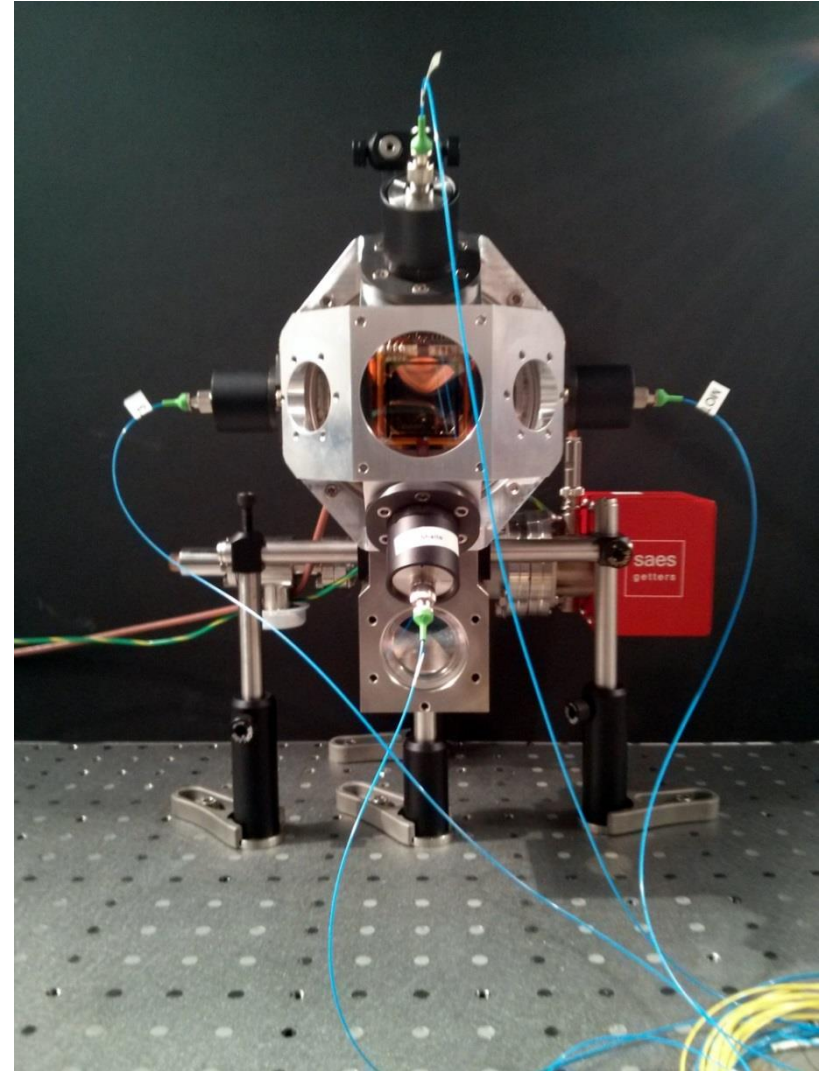
Courtesy of group of Philippe Bouyer, *Observatoire de Paris*  
(**MIGA** project)



# Examples of integrated systems: The i-Sense gravimeter

Video from University of Birmingham  
Prof. Andy Schofield

<http://www.birmingham.ac.uk/research/activity/physics/quantum/cold-atoms/index.aspx>



Courtesy of group of Prof. Kai Bongs, **University of Birmingham**  
for the EU FET-Open project **iSense** (grant no. 250072)

# The Power of Excellence: The Awards

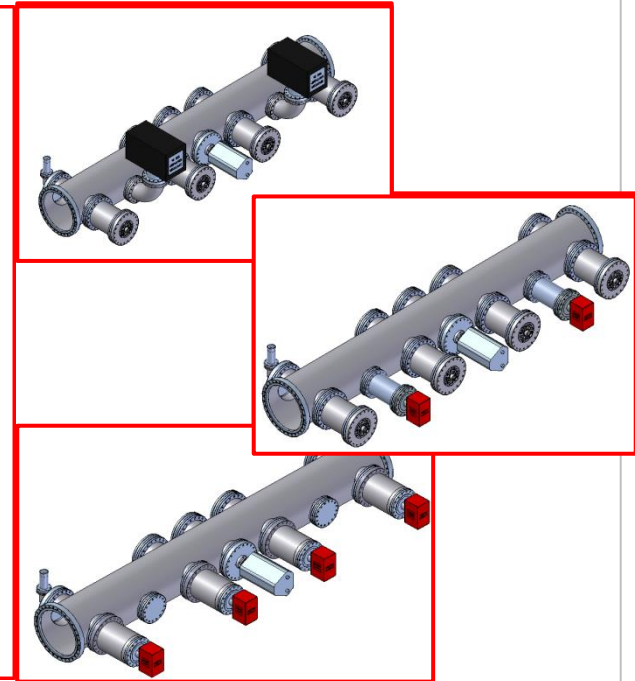
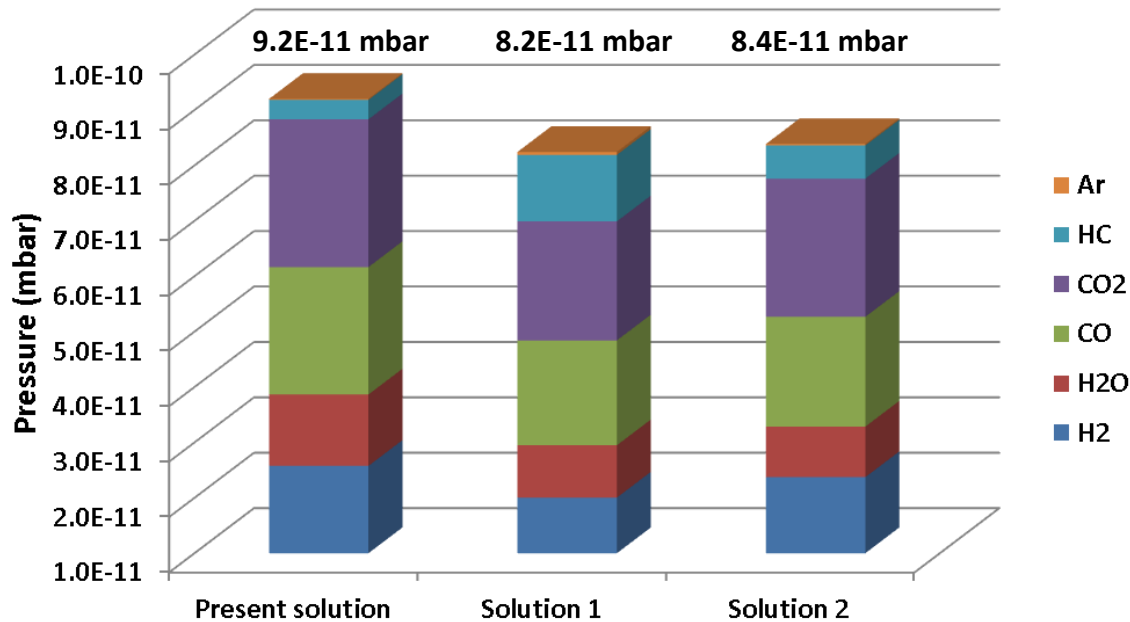


- ❑ The NEXTorr D 100-5 has been selected by an independent judging panel and editors of R&D Magazine as a recipient of a 2011 **R&D 100 Award**. This award recognizes the 100 most technologically significant products introduced in the year.

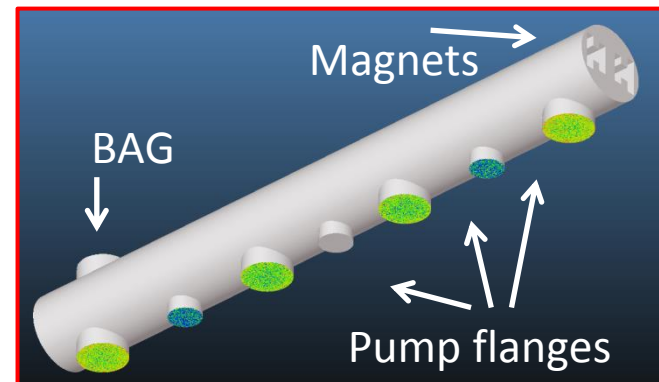
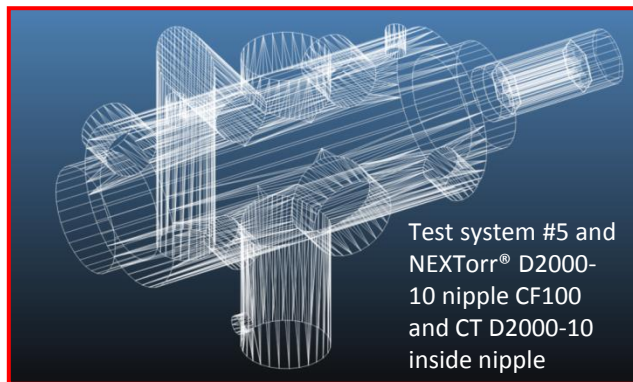
- ❑ RIAL has been the recipient of the **GOLDEN HADRON** from CERN as a recognition for quality excellence.



# Appendix - Examples of simulations: P distribution profiles

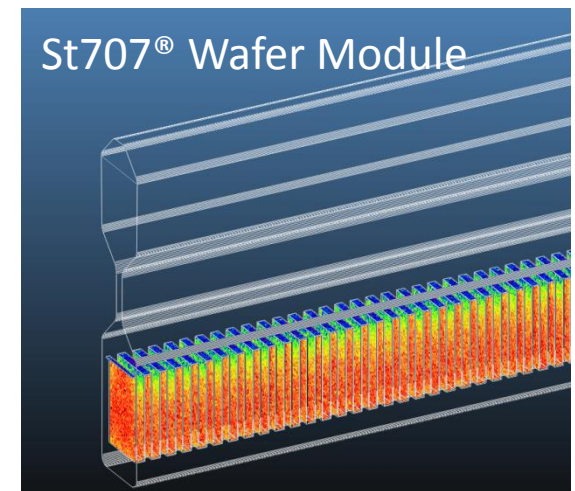
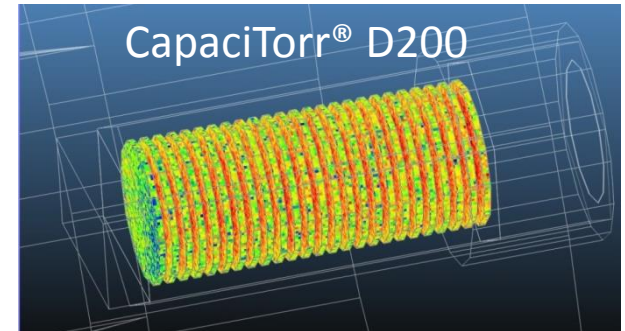
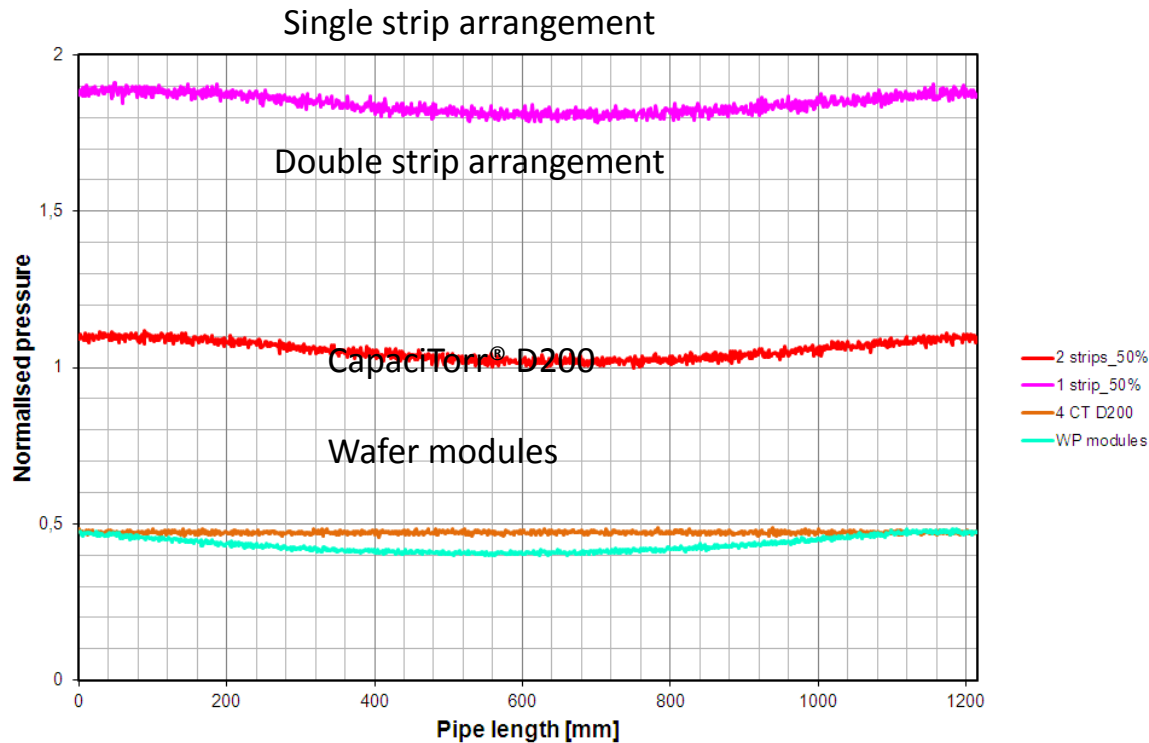
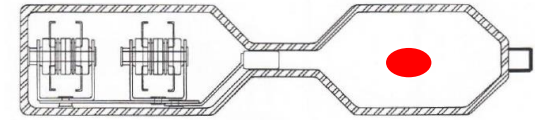


Courtesy of Dr. Ching-Shiang Hwang, Dr. Jui-Che Huang - Taiwan Photon Source, NSRRC (Taiwan)





- Hydrogen pressure profiles in the beam chamber



Courtesy of Mr. Bernhard Hippert and Dr. Gerald Schmidt – DELTA – Technische Universität Dortmund

Thank you for your attention



[www.saesgroup.com](http://www.saesgroup.com)