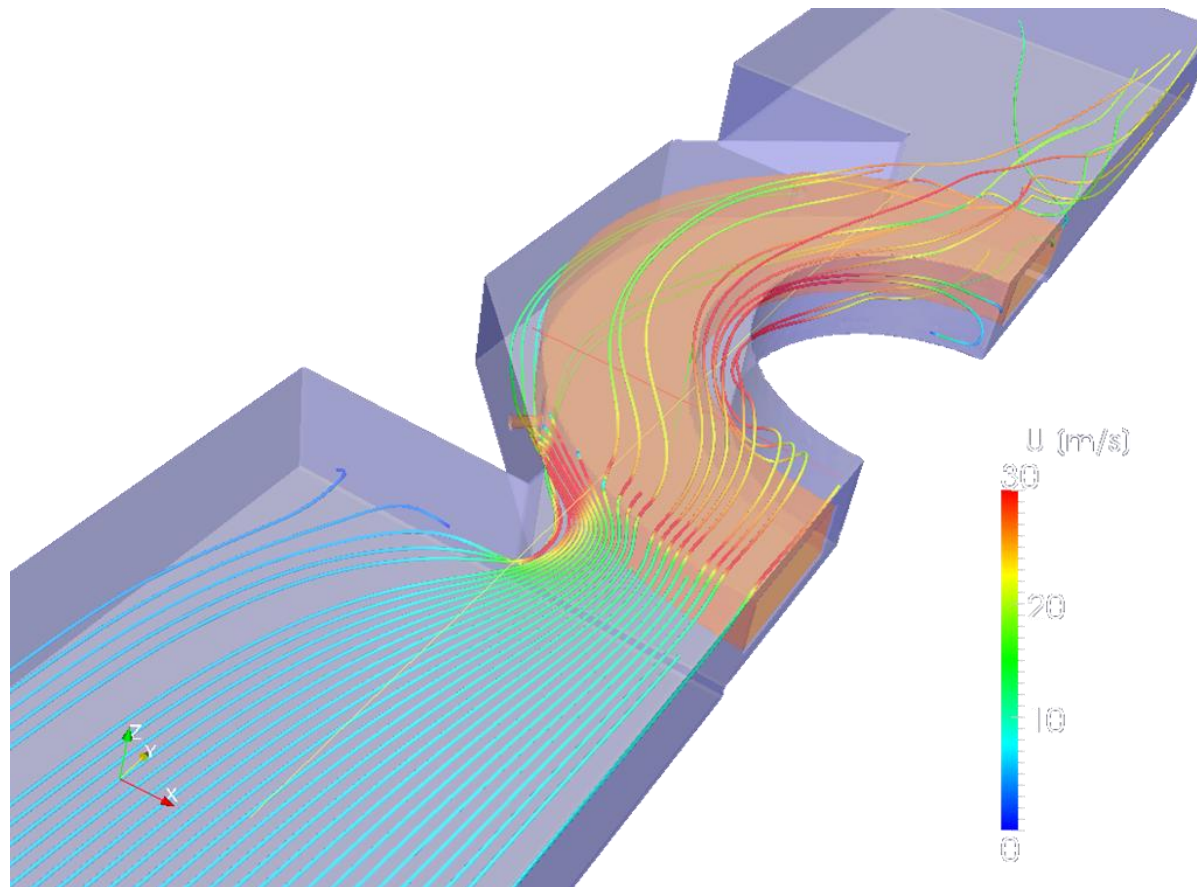




CFD team evolution at CERN





SUMMARY

- 1. High performance computing**
- 2. Open source CFD software**

Opportunities...

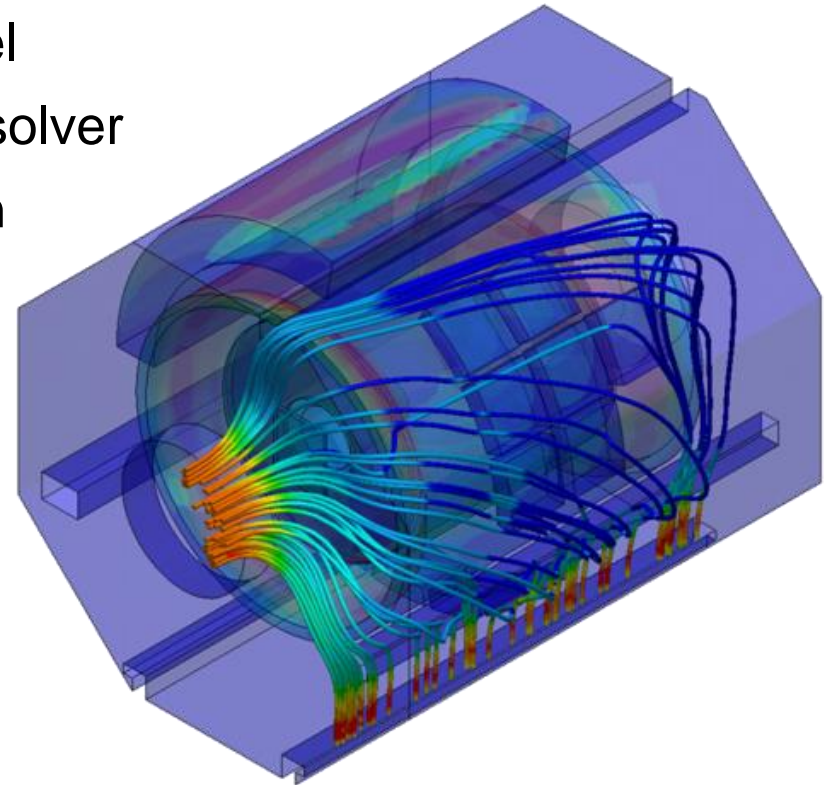
- PC speed and parallel calculation have reduced the numerical solution time (and cost)
- Meshing time (and cost) has dramatically decreased
- CFD is more and more integrated in the design tools
 - Automatic meshing
 - Model/surface importation
 - Subroutine facilities
 - CAD integration
- Interface more and more user friendly
- CFD more and more cheap... but:



The tool has an easy access and gives always a result...

...specific knowledge is required

- Efficiency to build the right model
- Selection of the right numerical solver
- Sensibility to result interpretation
- Training
- Experience
- Knowledge
- Problem sharing



CV group has a CFD team since 1993

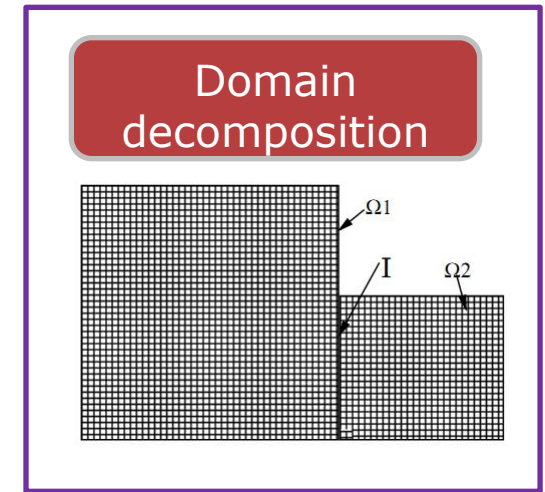
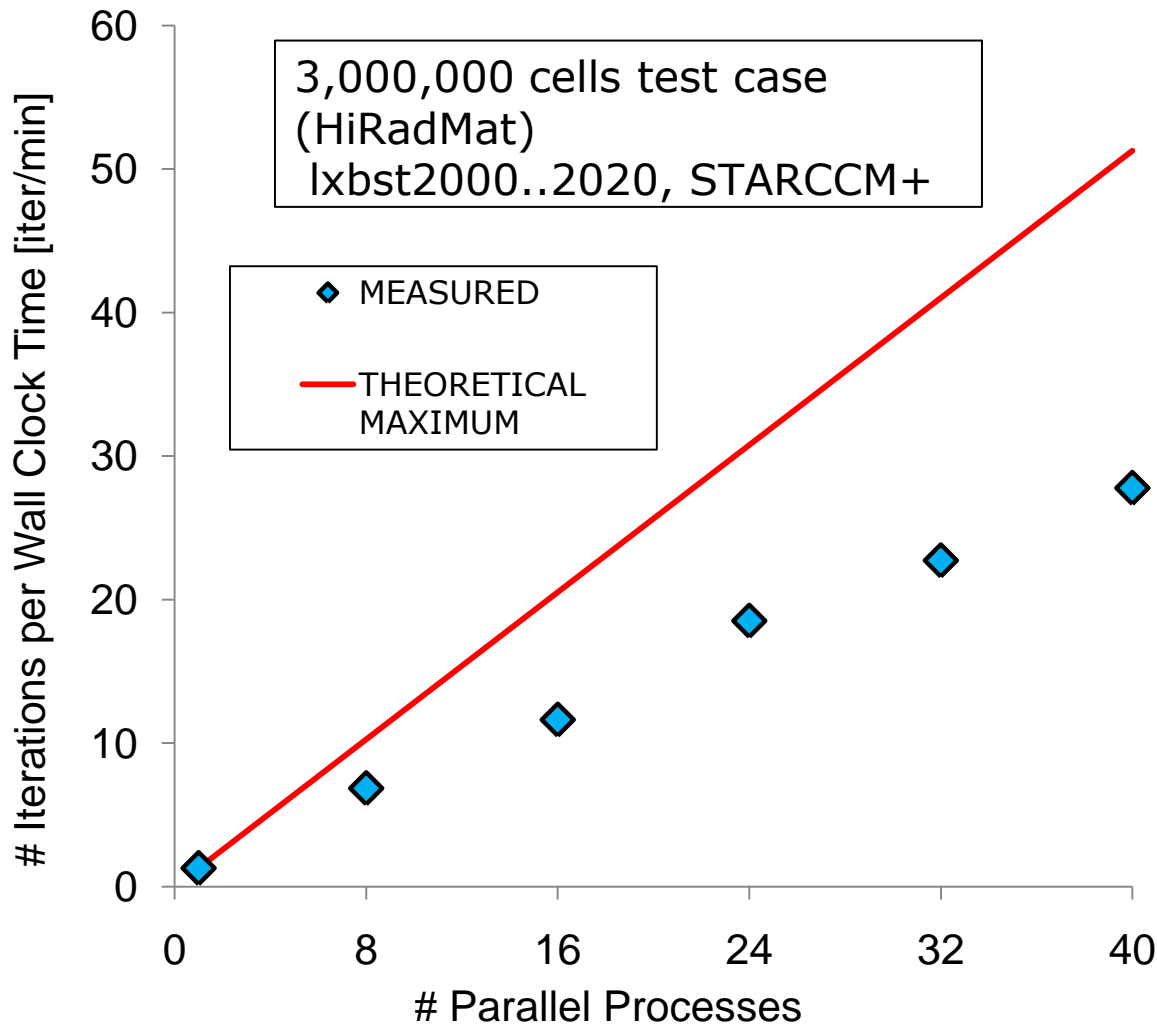
ENGINEERING BATCH CLUSTER

- 20 Viglen CPU servers
- 8 core Intel "Nehalem" L5520 chips
- 48Gb of memory
- Low-latency "Net Effect" 10Gb Ethernet
- Optimized for MPI applications under LSF
- Dedicated to CFD Team and BE users

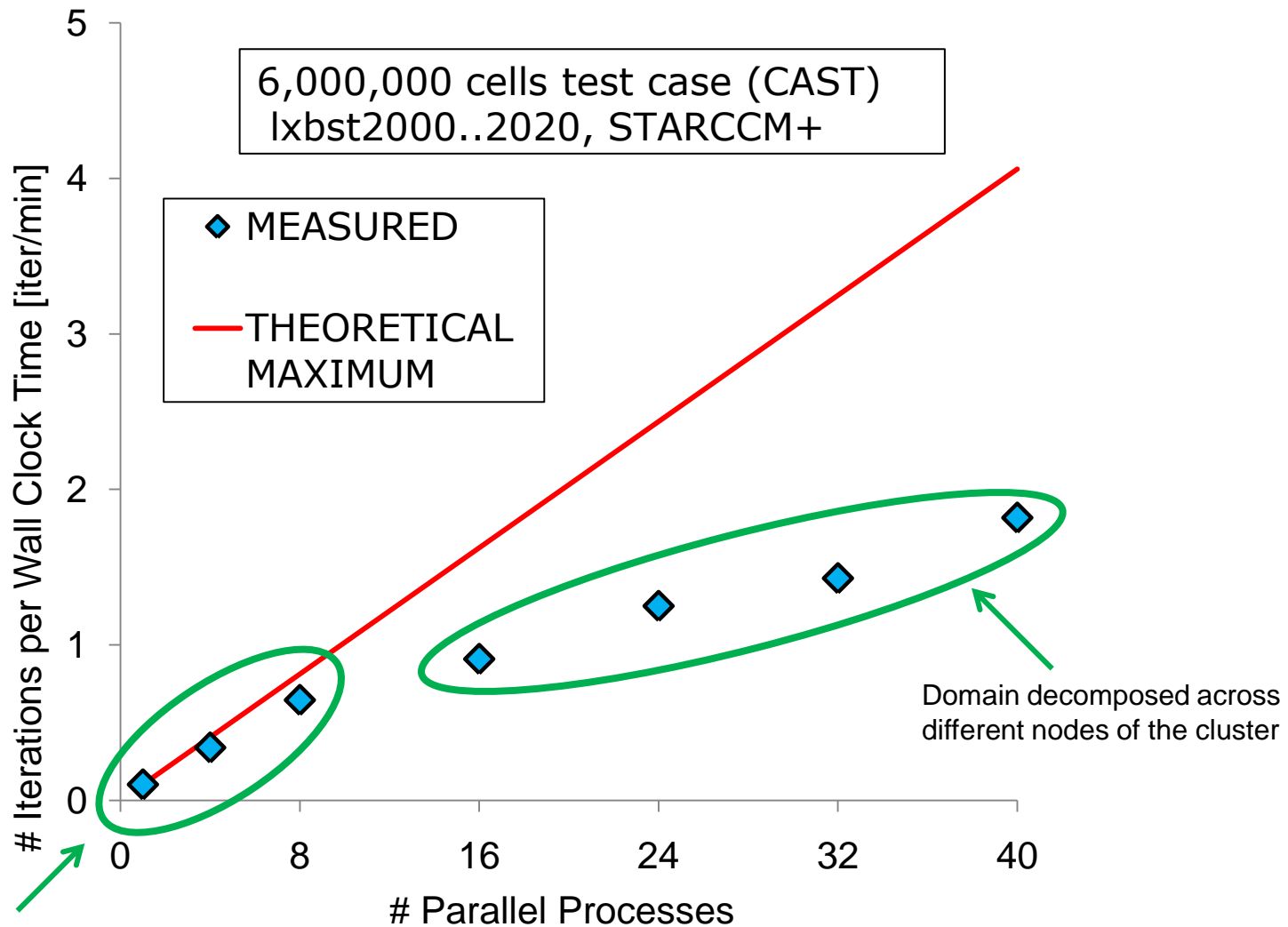
CFD SOFTWARE

- STAR-CCM+
- STAR-CD *(80 licenses)*
- OpenFOAM 1.7.1

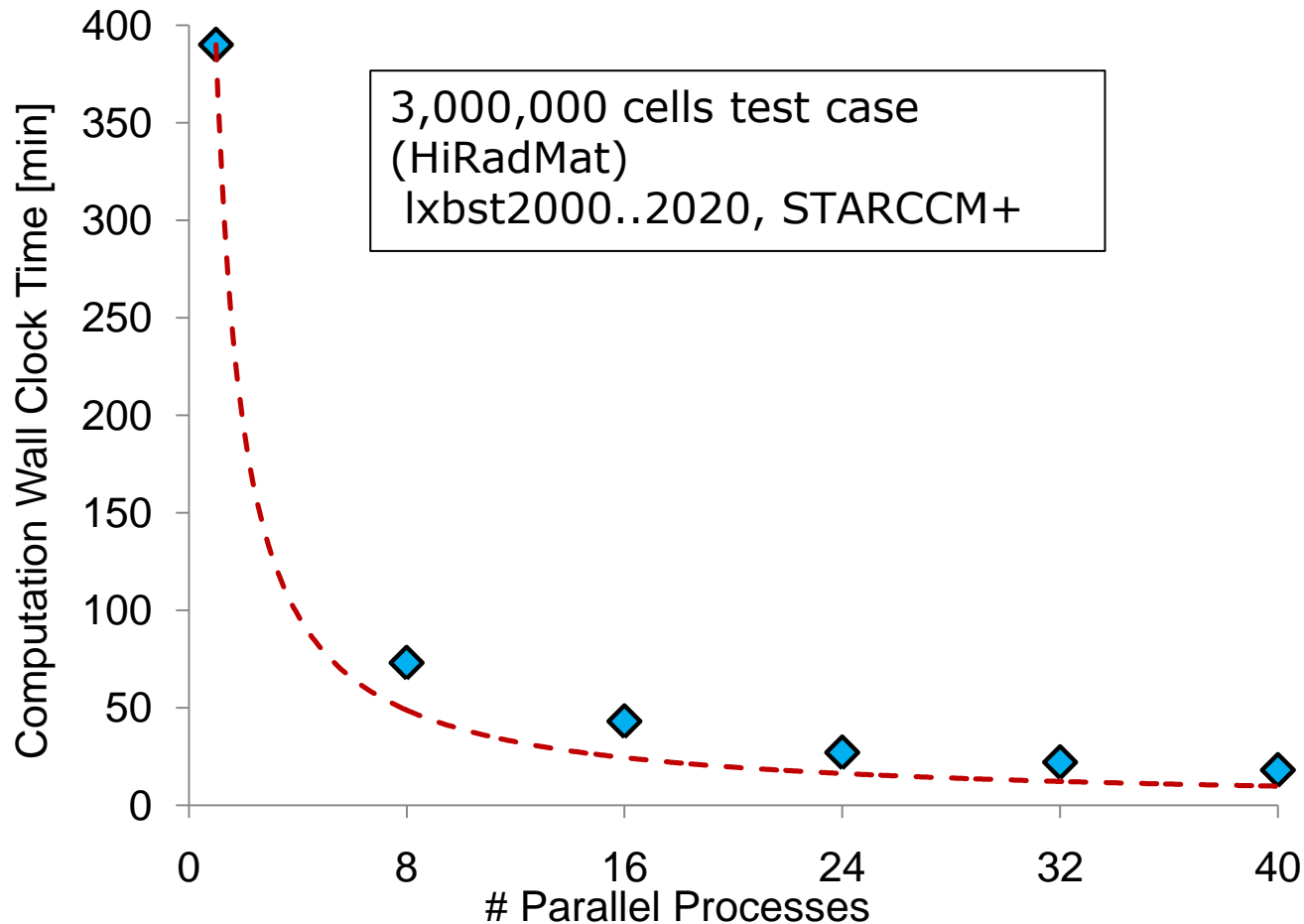




• Parallel computing speeds up CFD



Fast interconnection is essential

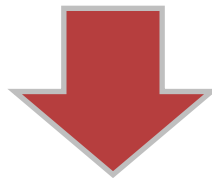


- Reducing computational time
- Solving more complex problems/geometries
- Solving different versions of the same case

OpenFOAM 1.7.1

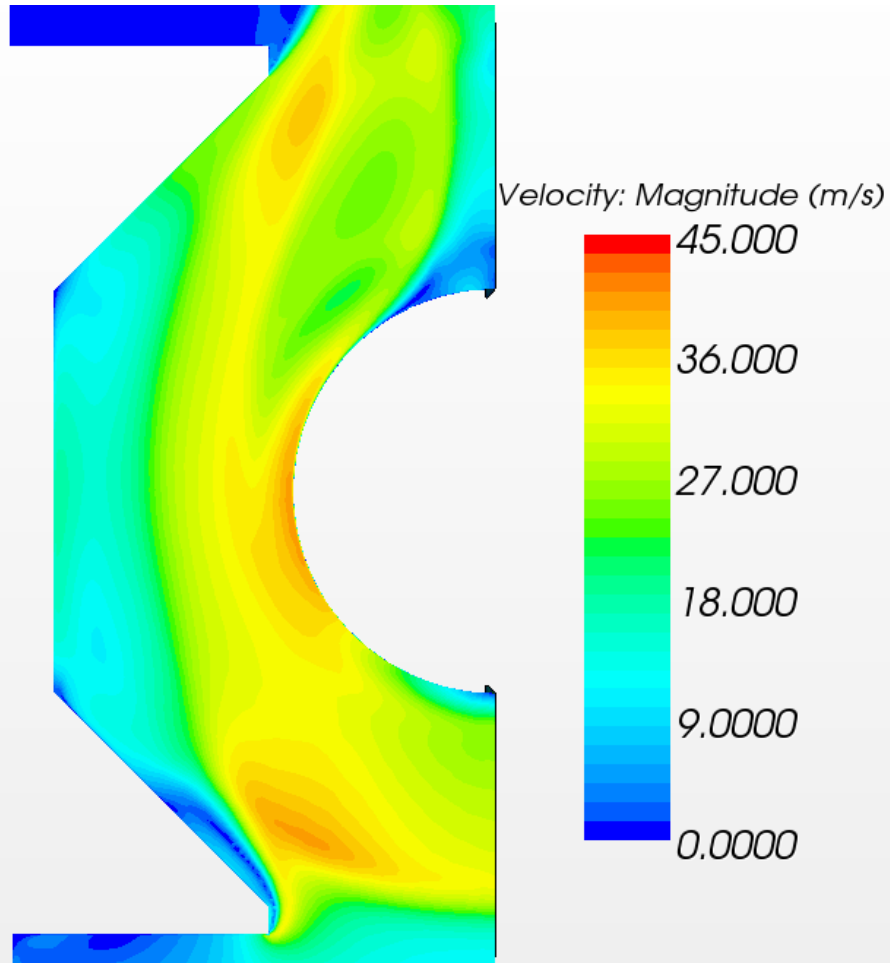
(Open Field Operation And Manipulation)

- Open source toolbox
- Meshing, Solving & Post-processing work in parallel
- No licenses constraint
- Conversion to/from major commercial codes formats

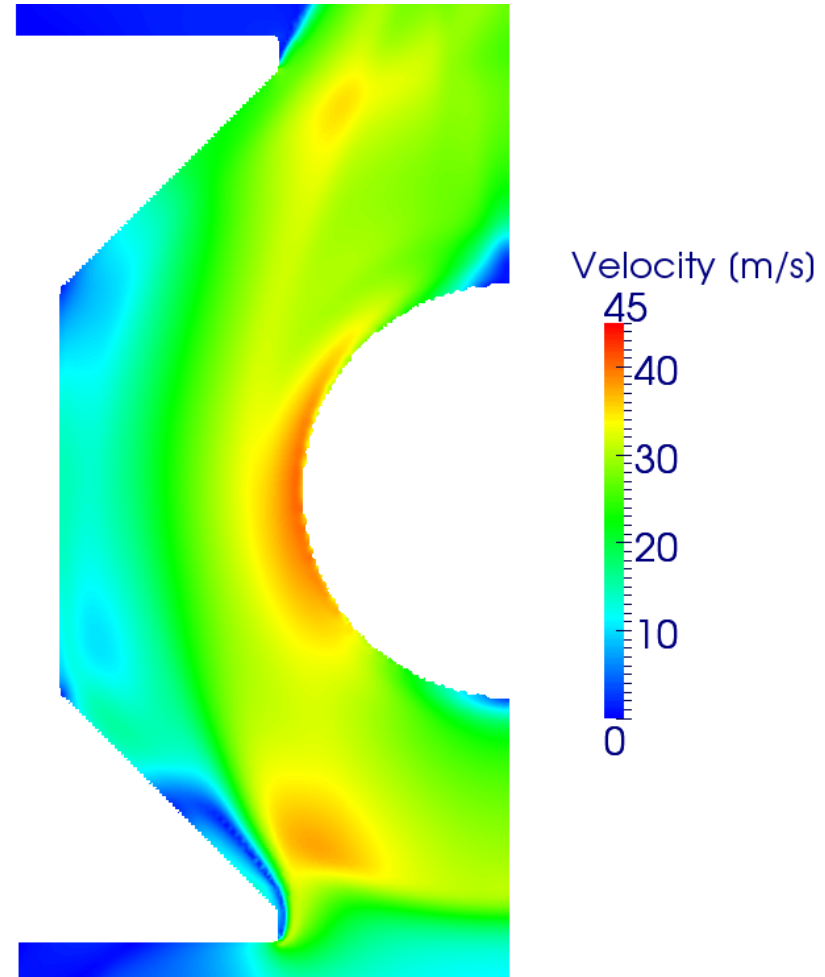


- Higher flexibility
- Better exploitation of the computational resources

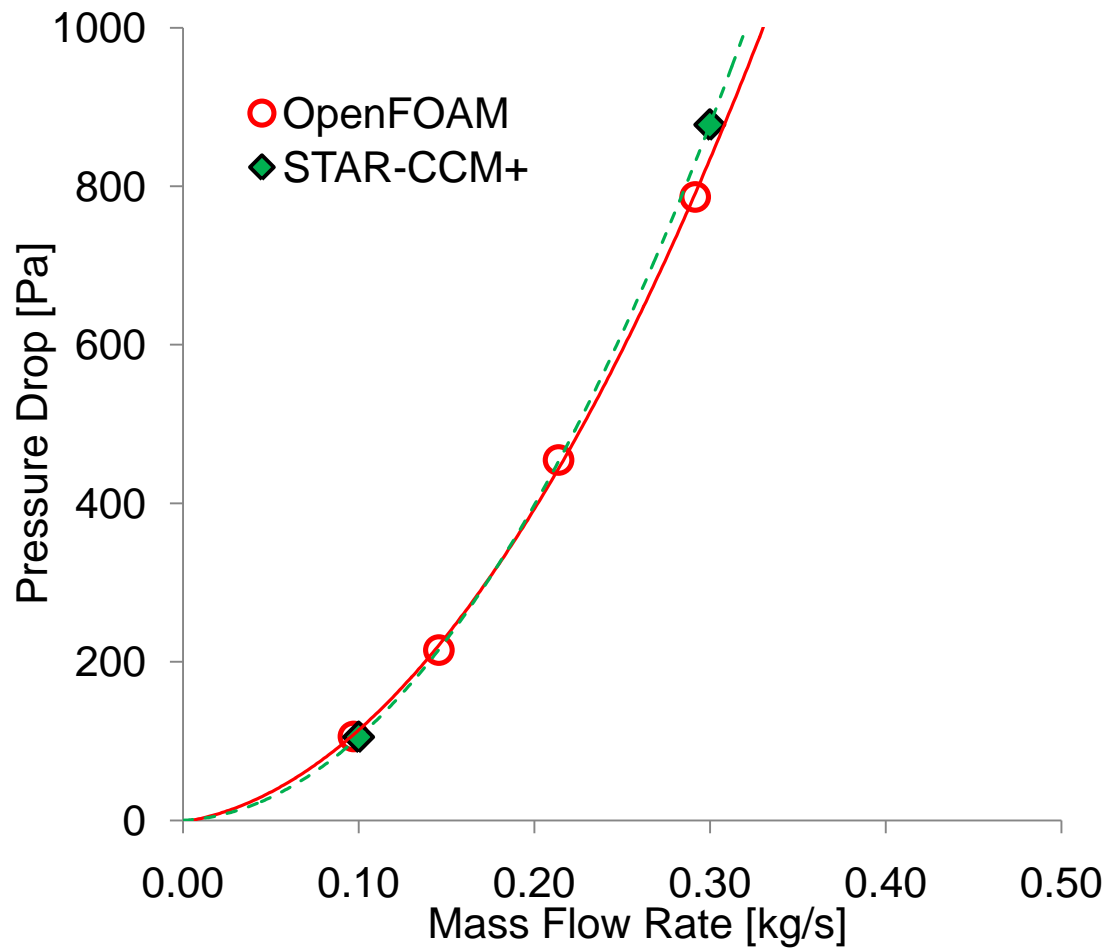
Radio Frequency Cavity, Mass Flow Rate 0.3 kg/s



STARCCM+



OpenFOAM



OpenFOAM and STAR-CCM+ predicted the same pressure drop values

CONCLUSIONS

- 1. CFD is very useful at CERN (design speed up, insight analysis, ...)**
- 2. Large computing resources available at CERN allows to perform fast and complex CFD analysis**
- 3. The CFD Team of EN/CV has the specific knowledge required**
- 4. CFD Team is enlarging the CFD tools available in order to better use the resources and increase flexibility**

**THANK YOU
FOR YOUR ATTENTION**