

ANTWERP

# PLENARY: Challenges in HPC after Exascale

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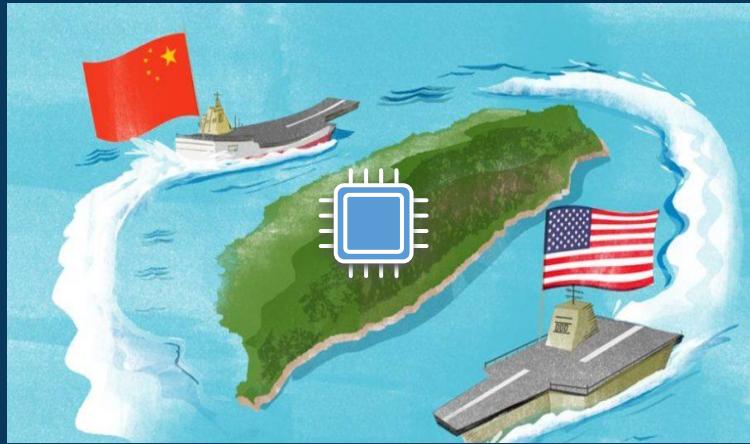
Fabrizio Del Maffeo - (Axelera AI)

Sergi Girona - (Barcelona Supercomputing Centre)

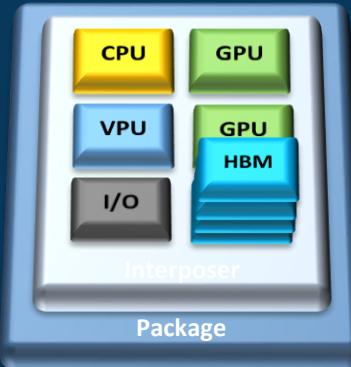
Leonardo Flores Añover (EC) - Moderator

# Challenges in HPC after Exascale

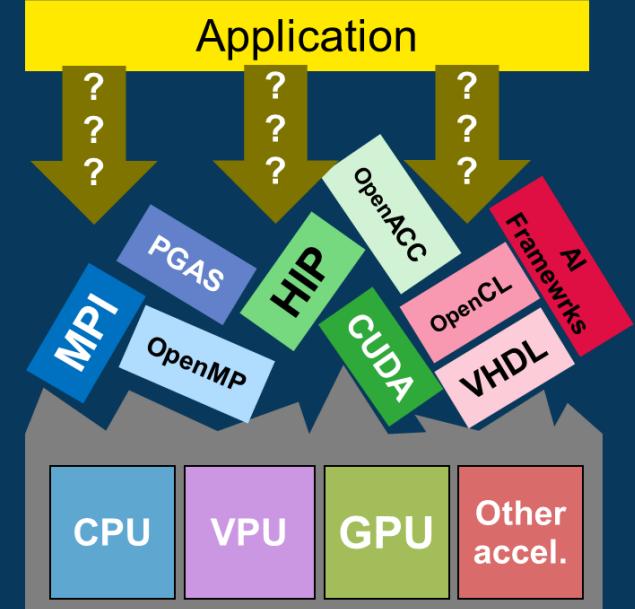
<https://woodsideprint.com/feature/2022/01/12/taiwan-vs-china-whats-at-stake/>



Technology dependency



Even more HW heterogeneity



Lack of performance portability



HPC

HPC vs. Hyperscalars

<https://globalenergymonitor.org/projects/global-coal-plant-tracker/>

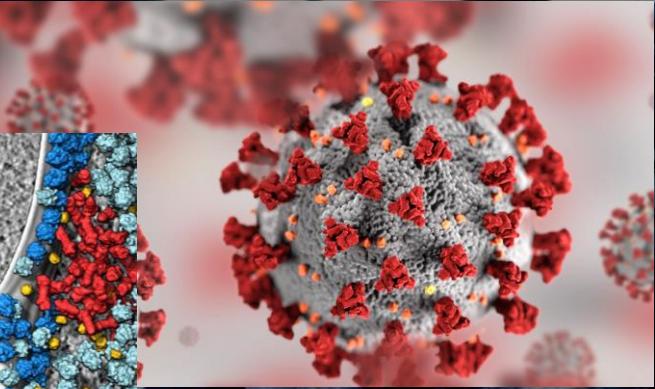
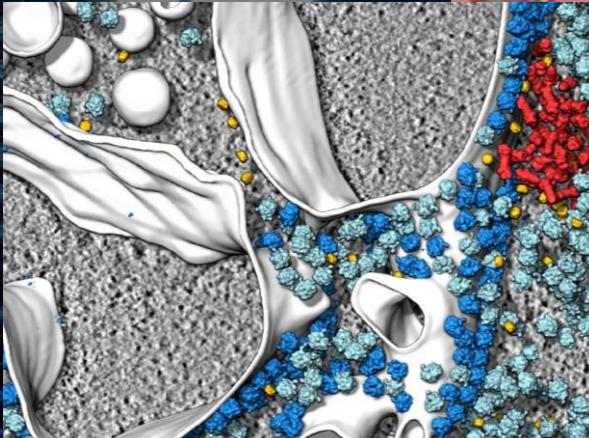
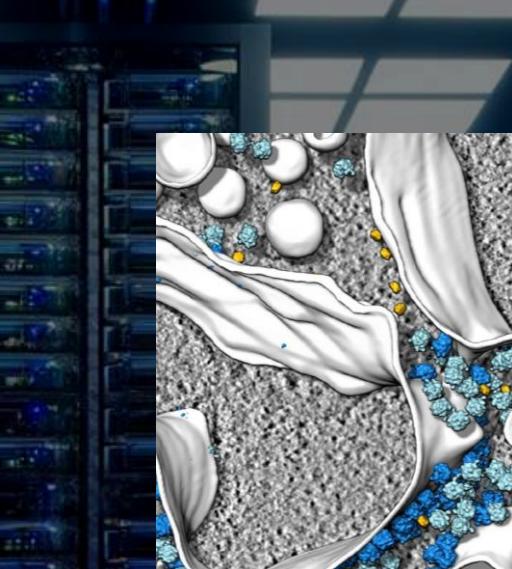


Justify use of energy and natural resources

*Estela Suarez*  
18.03.2024, Antwerpen



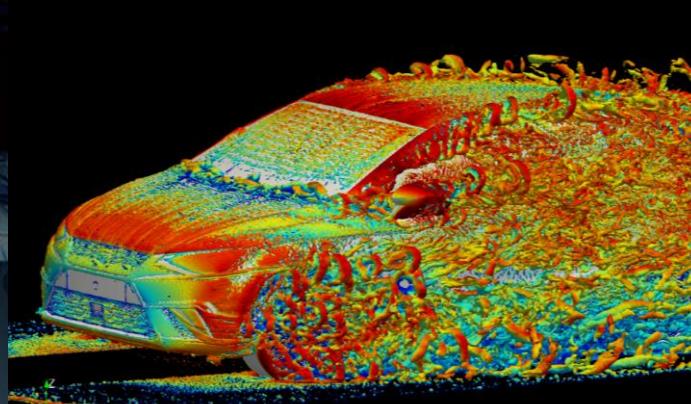
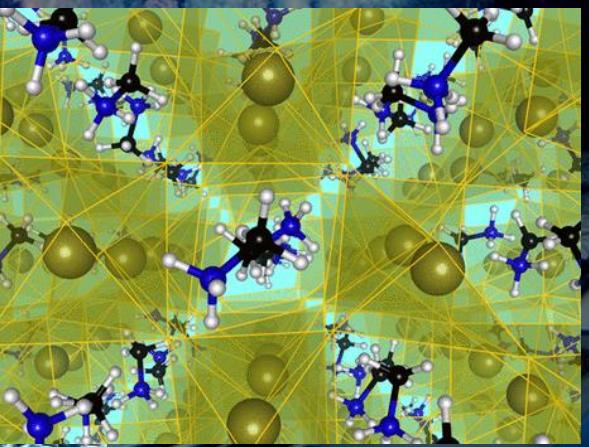
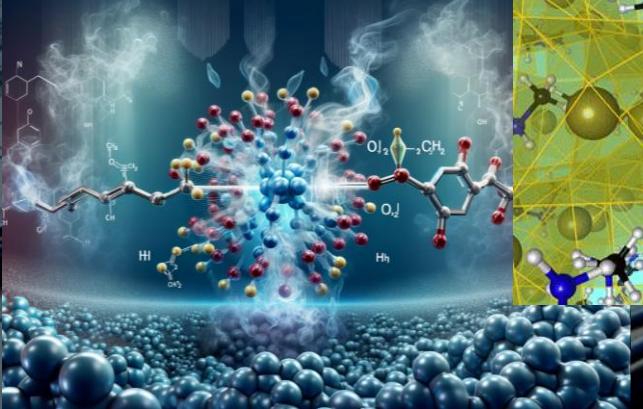
Climate modeling & weather prediction



Life science:  
Pharmaceutical design & whole-cell modeling

## Impact: Data & Software is the key frontier

Material science:  
H<sub>2</sub> production, solar cells



Engineering, CFD,  
Data analytics

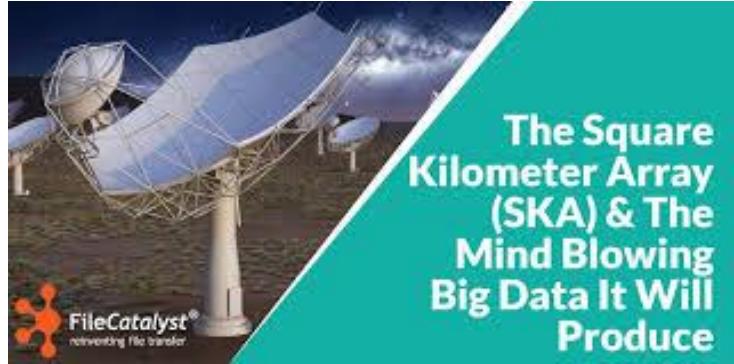
```
mirror_mod.use_x = True  
mirror_mod.use_y = False  
mirror_mod.use_z = False  
elif operation == 'MIRROR_Z':  
    mirror_mod.use_x = False  
    mirror_mod.use_y = False  
    mirror_mod.use_z = True  
  
    #select the end - add back the deselected mirror mod  
    mirror_mod.select= 1  
    modifier_mod.select=1  
    bpy.context.scene.objects.active = modifier_mod  
    print('Selected' + str(modifier_mod)) # modifier_mod is the active  
    mirror_mod.select= 0
```



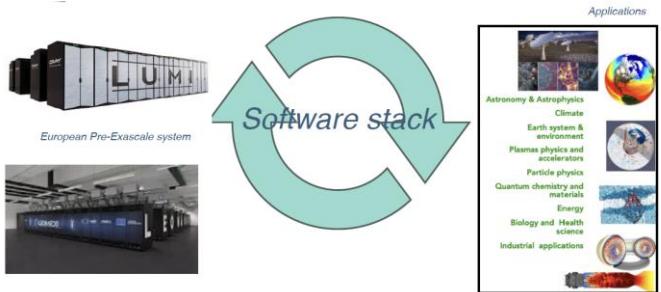
We need Manhattan-scale projects focused on solving societal problems

# Some post-exascale challenges

From edge to HPC systems  
The digital continuum

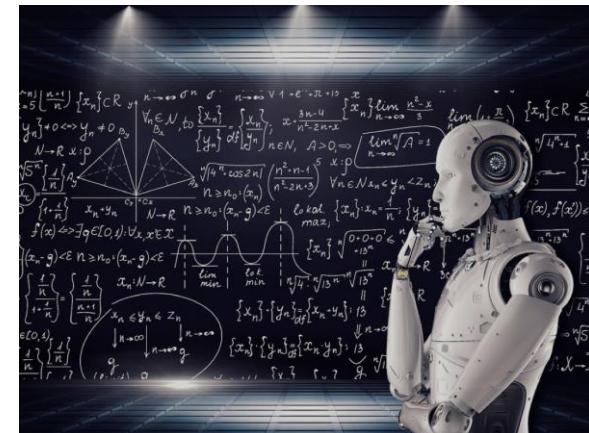


Software/application co-design



International collaboration  
is key - The International  
Post-Exascale project  
(InPEx)

AI4Science – Science4AI



Software, the new frontier

Need for a proper European  
agenda – InPEx-EU



# CHALLENGES TO BE ADDRESSED FOR THE NEXT GENERATION/POST-EXASCALE OF HPC

*Fabrizio Del Manno, CEO & Co-Founder Axelera AI*

## 1) SCALING COMPUTING POWER

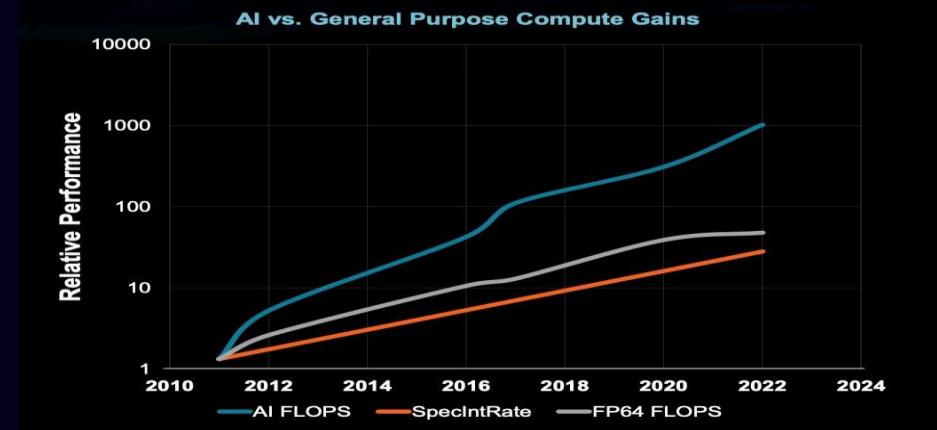
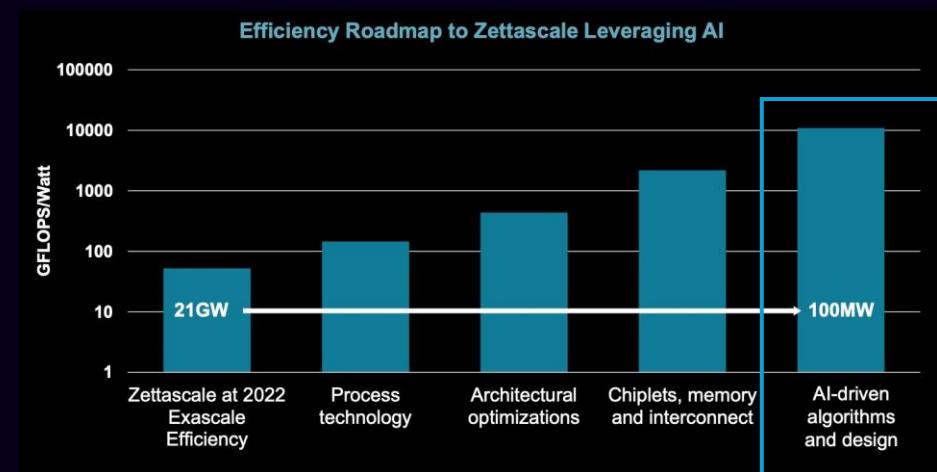
*Classical computing doesn't allow to scale easily to Zettascale, we need an hybrid approach with classical computing and AI*

## 2) WORKING AT LOWER COMPUTING PRECISION

*Lower precision computing (FP32/16/8) and machine learning to solve classical AI workload*

## 3) EU SOVEREIGNTY IN COMPUTING (HPC / AI)

*It requires a very ambitious plan and a strong sense of urgency*



Lisa Su, Plenary Session, ISSCC 2023, Feb





## Challenges in HPC after exascale (some of them)

Sergi Girona  
Barcelona Supercomputing Center

March 18, 2023