

Extinction

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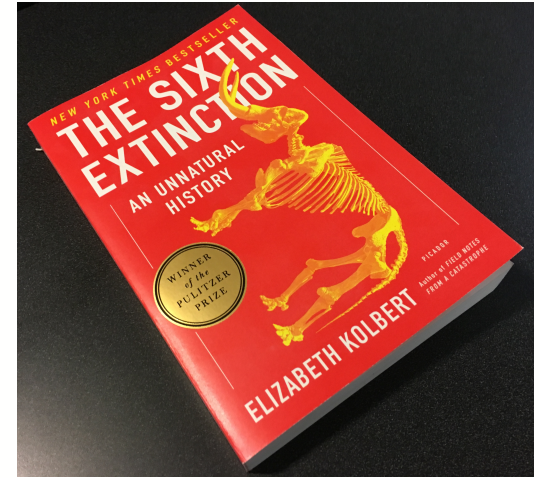
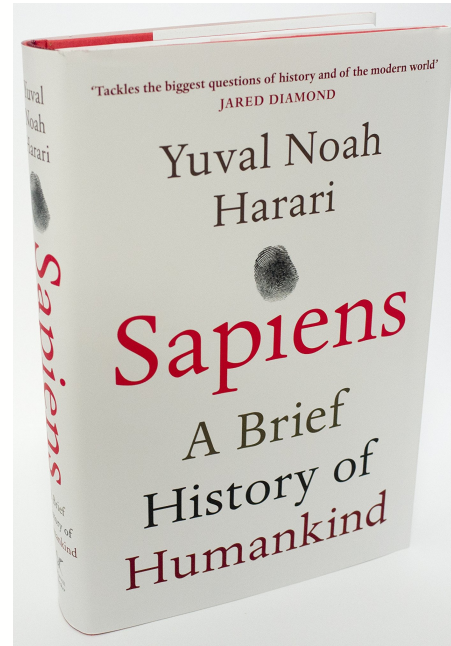
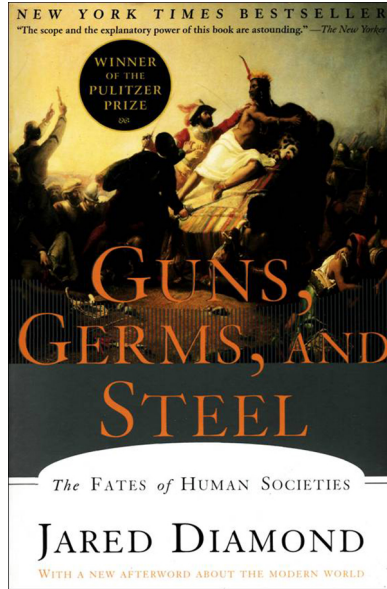


...or, is there such in big science?

This is a nuclear physicist's attempt to find analogies between evolutionary biology and big science facilities.



Inspired in part by:



...and by my personal views/experiences on the big science

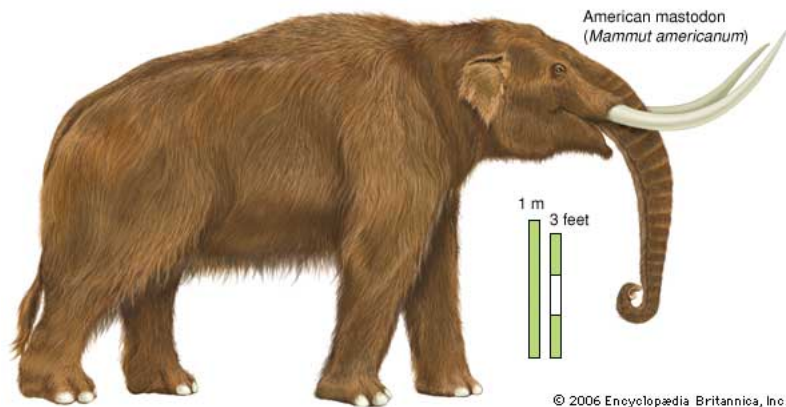
Why have so many mega-structures of the nature extinct?

Dinosaurs, to begin with, died for obvious reasons. On the individual level it narrows down to the loss of habitat (climate change) and food.



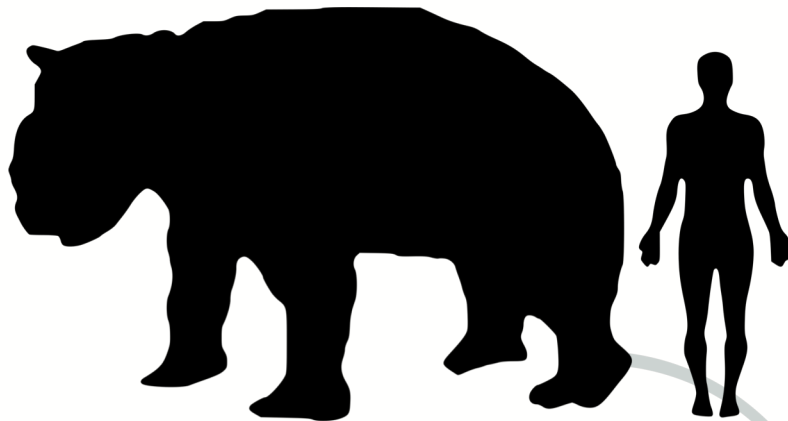
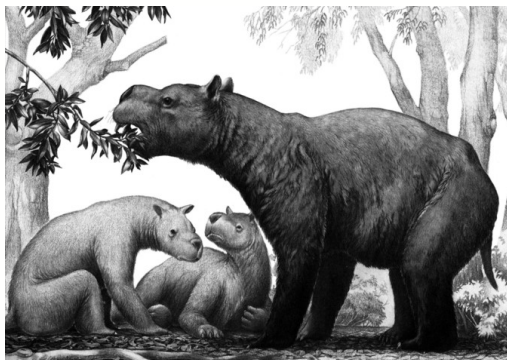
Ice Age

More recently, the end of the latest **pleistocene ice age** (11 500 BP) saw the demise of many large mammals. The reasons for this are mostly the climate change with its knock-on effects. But unlike with the dinosaurs, this time *Homo Sapiens* was around.



Australian megafauna

Another recent event was the extinction of Australian megafauna. This was almost entirely caused by *Homo Sapiens*.



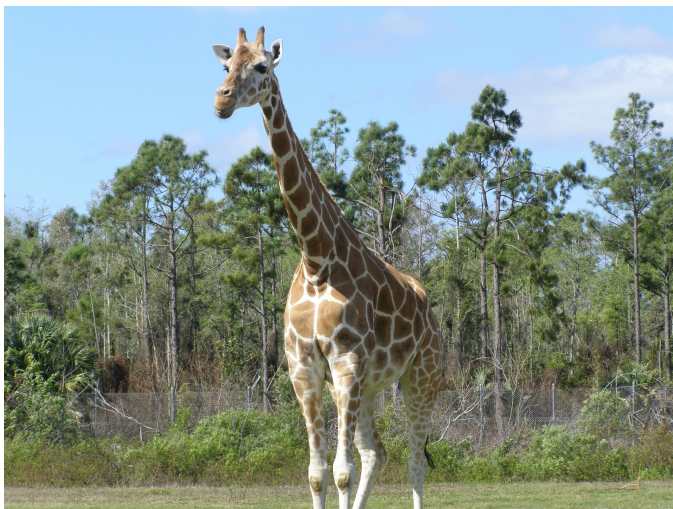
Being big (mammal)...

...is *not very energy efficient*. One has to eat a lot.

Furthermore, the really big ones do not usually have *natural enemies*.

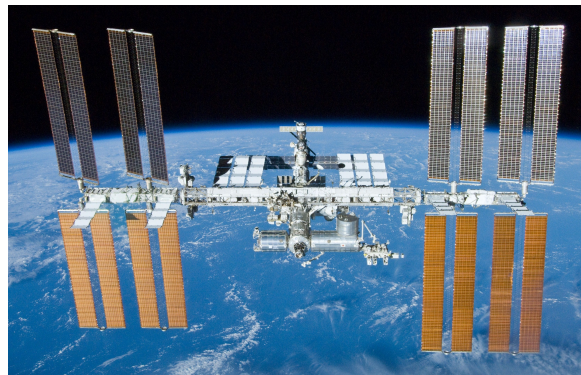
→when predators appear, the big ones are *not afraid* of them.

The size can have a tradeoff: the big ones are usually slower to move.



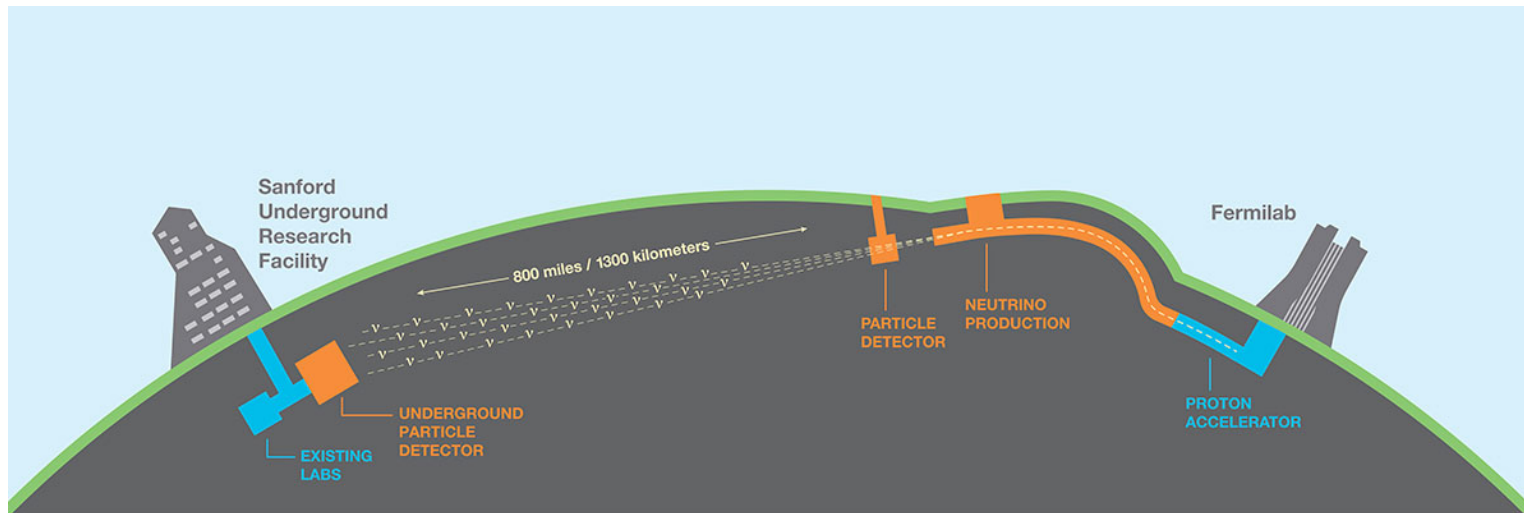
Can there be extinction in the big science?

- Energy vs. cost/capital
- Natural enemies vs. uniqueness
- Small predators vs. dynamic, small facilities



Most likely not that much, since...

- "Evolution" of science: new state-of-the-art ideas usually appear as a matter of course.
 - Collaboration!



A case study: FAIR \leftrightarrow HIP \leftrightarrow JYFL-ACCLAB in Finland

From a university-based laboratory to big science of FAIR



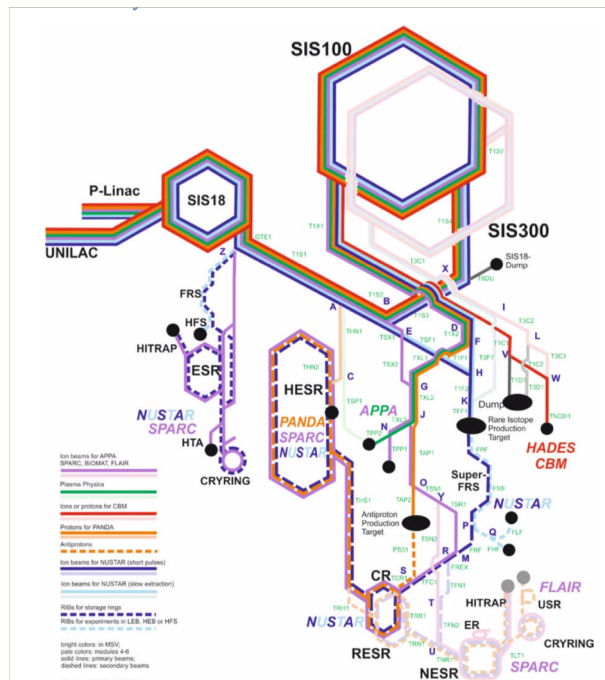
Some background

- Helsinki Institute of Physics is a consortium of five Finnish universities.
- Its core business is to coordinate Finnish research and resources in CERN and FAIR.
- In Finland, FAIR (NUSTAR) activities are mostly concentrated in Jyväskylä:
Nuclear physics
Accelerator Physics

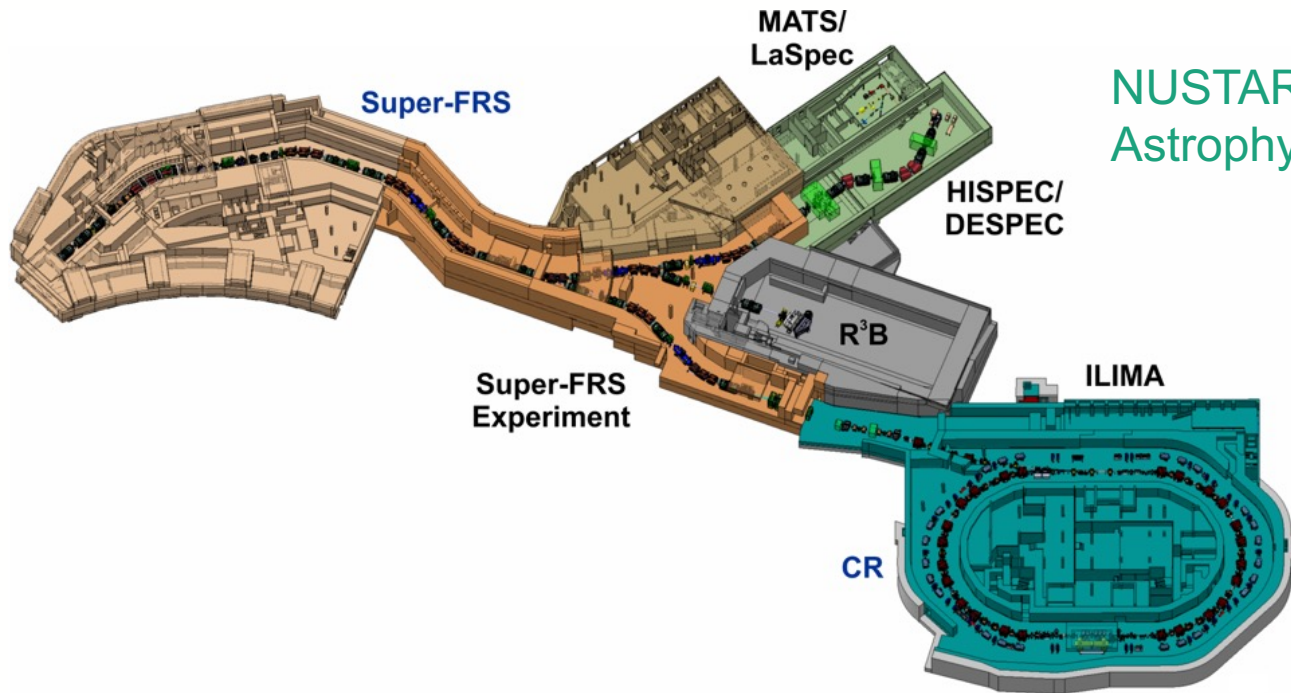
Some background

Four *science pillars*:

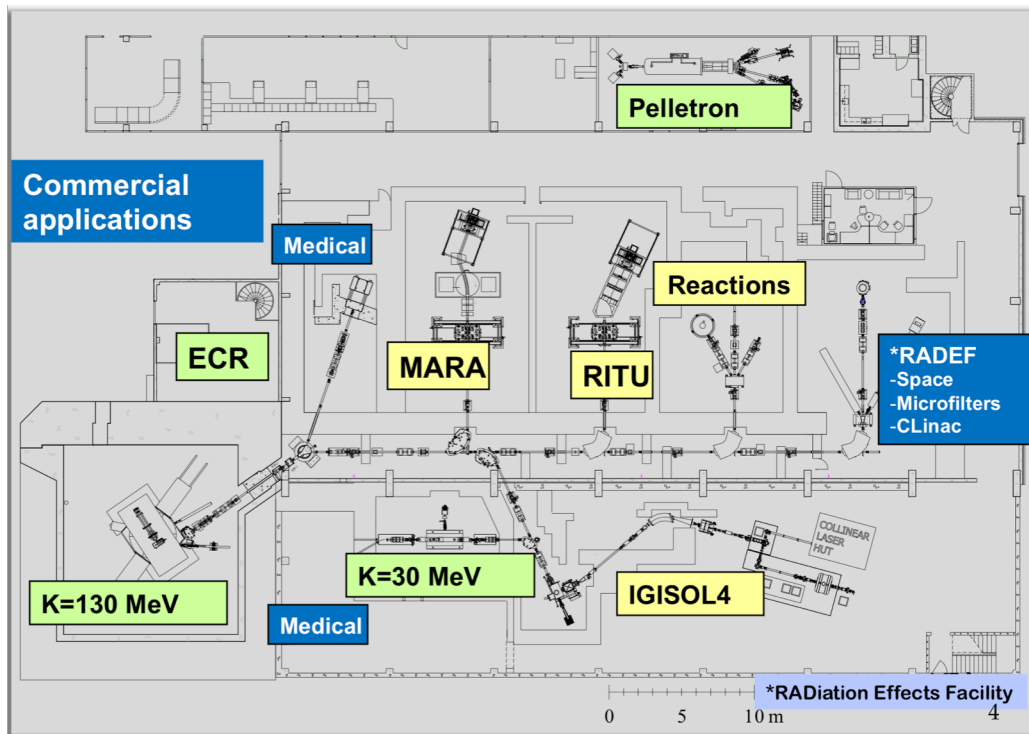
- **APPA**: atomic and plasma physics, applications
- **CBM**: baryon-rich matter, QCD phase diagram
- **NUSTAR**: nuclear structure, astrophysics and reactions
- **PANDA**: high-energy antiproton physics



Some background



NUSTAR: NUClear STructure,
Astrophysics and Reactions

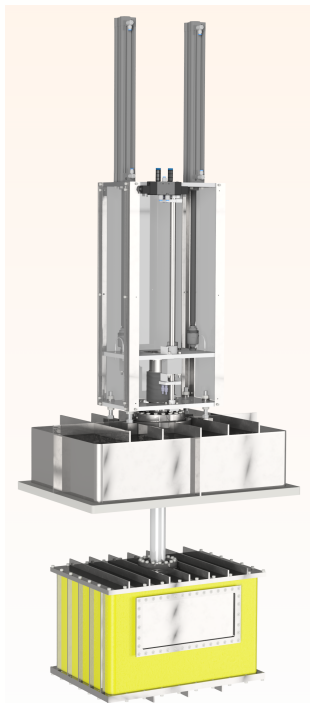


Finnish FAIR strategy

- ✓ *Exploit the knowledge* gained at the University of Jyväskylä Accelerator Laboratory and at the HIP Detector Laboratory
- ✓ Carry out *complementary* research at FAIR
- ✓ Science cases overlapping with NUSTAR, methodologies differ

Finnish FAIR strategy

- Use existing expertise, such as detector design and mechanics for the detectors.
These are ideal to do in house
- Outsource what can be reasonably outsourced





Thank You.