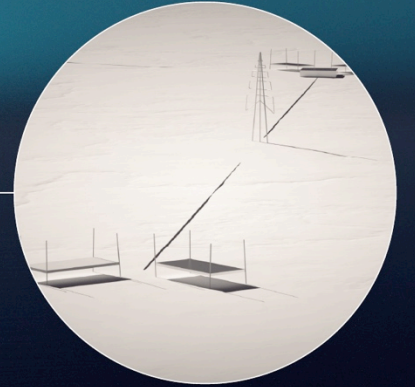


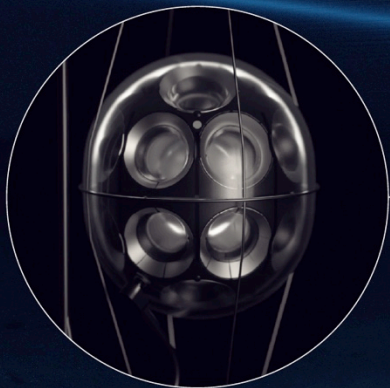
# ICECUBE GEN2



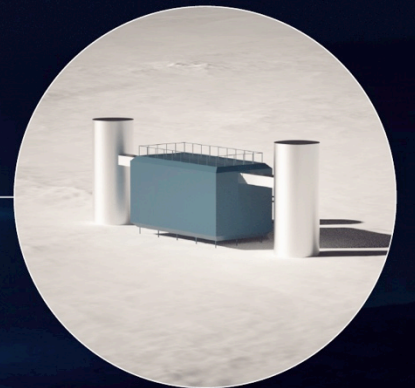
**Radio Array** | Station



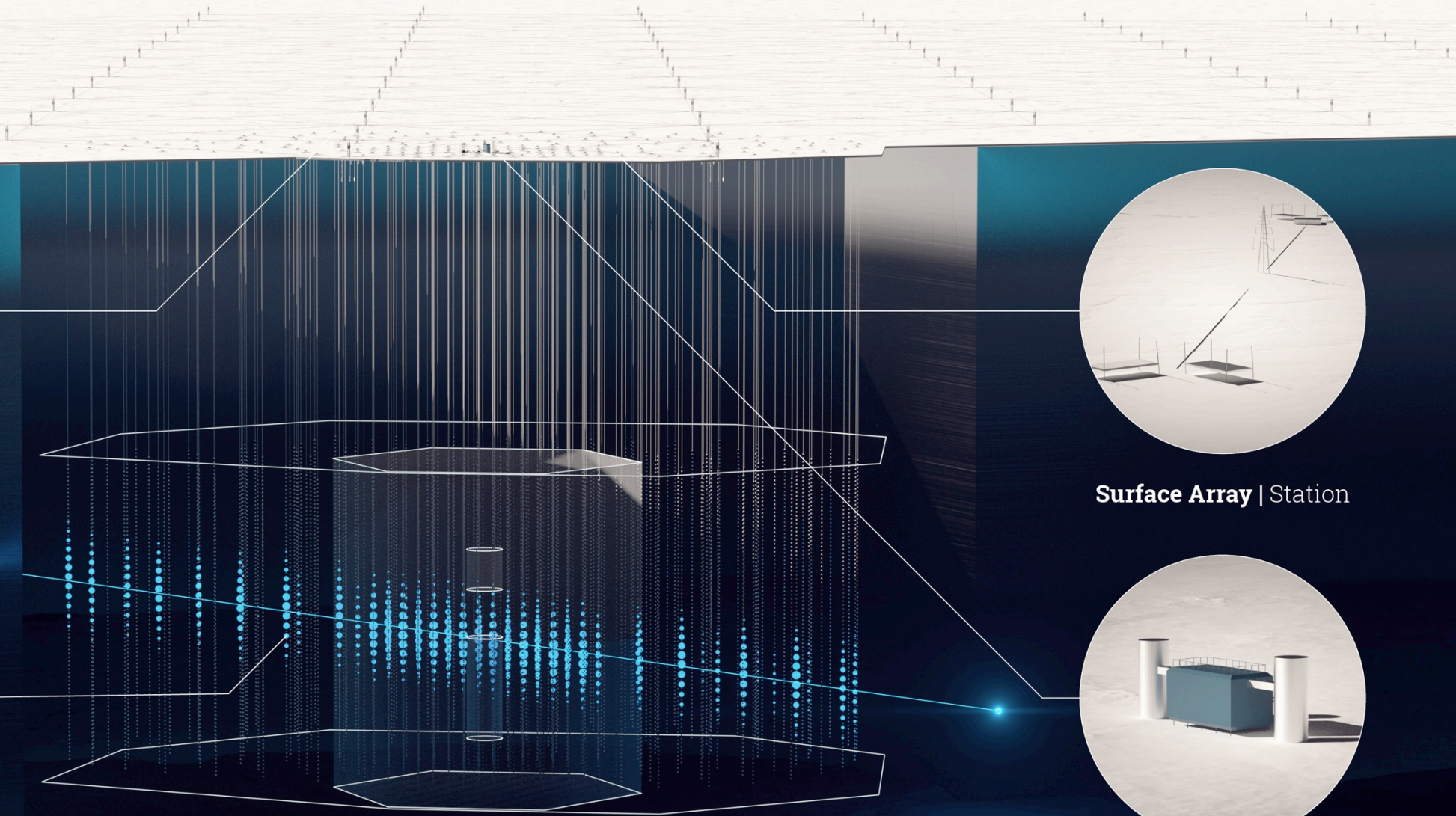
**Surface Array** | Station



**Optical Array** | Sensor



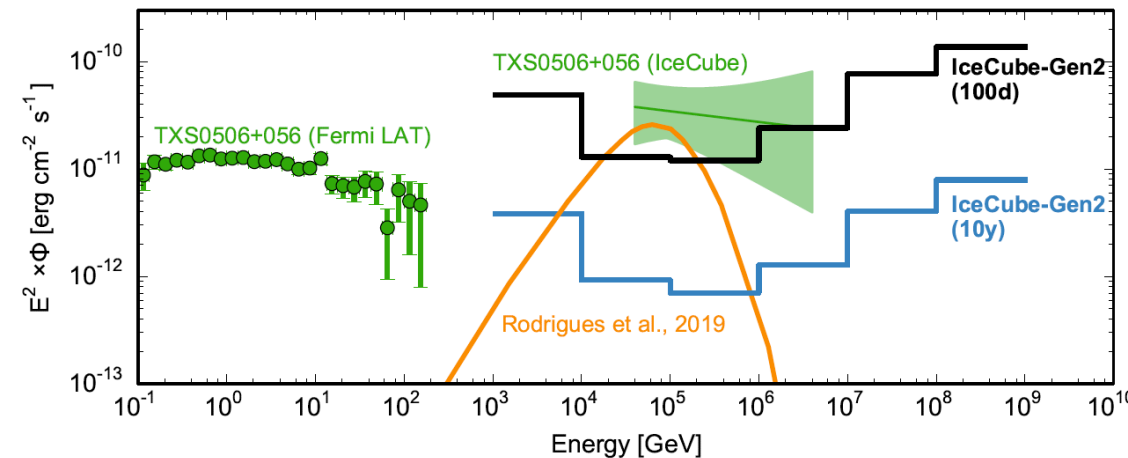
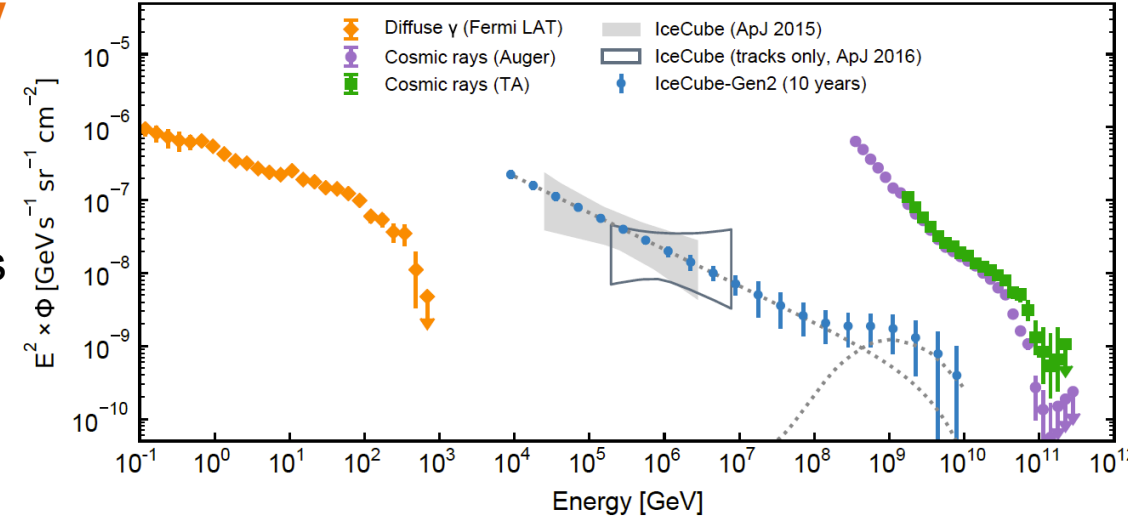
**IceCube** | Laboratory



# IceCube-Gen2

## Optimizing scales for leading sensitivity from $10^9$ to $10^{20}$ eV

- Multipurpose neutrino (and cosmic ray) observatory with unique discovery potential from  $10^9$  to  $10^{20}$  eV
- International collaboration of 400+ scientists from 13 countries
- Germany is the second strongest partner after the USA (DESY+KIT+10 German universities)
- Costs: ~500Mio \$ (US accounting) of which German groups are planning for a 20 + 20 Mio € in-kind contribution from Helmholtz and BMBF, the latter are funds for Universities
- Project was favorably evaluated in various roadmap processes, including in Astro 2020 US Decadal Survey and Snowmass, and appears on the Helmholtz Roadmap
- Construction could start as soon as 2026 with an 8 year construction phase. Ongoing discussion with NSF about funding application and South Pole access



# Status and Timeline

- DS2020, Snowmass, P5 APPEC, behind us. We are in a good position, compared to two month ago. Now is the time to push Gen2 and see what we can achieve.
- Discussion between project leadership and NSF ongoing. Overlap with Upgrade is simultaneously blessing and curse (there is communication and working routine vs Upgrade intense effort and requires prioritization).
- BMBF funding currently tight, but we need to prepare anyway. NSF needs to couple to BMBF
- German national roadmap process might open up soon (end of 2024). We should consider to apply and will need a plan for our contributions.
- Gen2 remains central for the current Helmholtz POFV funding application by DESY+KIT

## Quotes from the P5 report:

“We recommend the following:

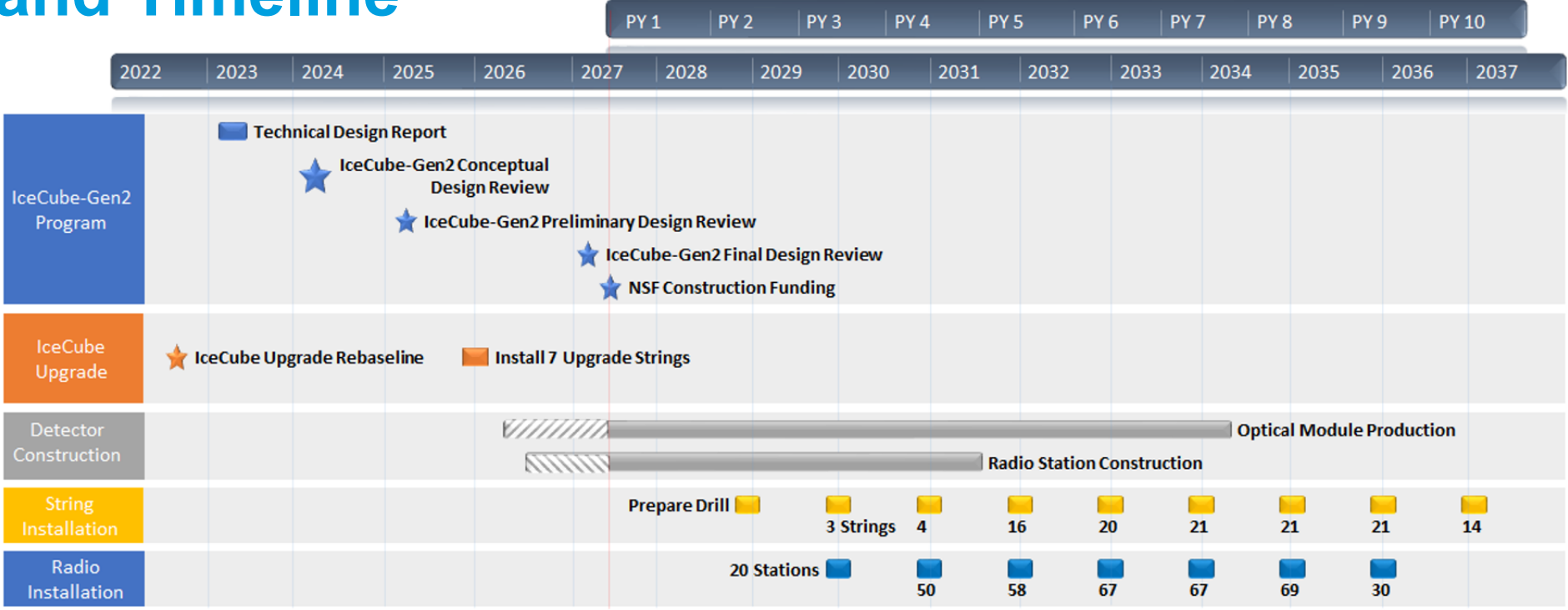
[...]

5. IceCube-Gen2 for the study of neutrino properties using non-beam neutrinos complementary to DUNE and for indirect detection of dark matter.”

“The significant advancements in our understanding of inflation and the early universe by CMB-S4 and the wide range of exciting science enabled by neutrino astrophysics by IceCube-Gen2 will be made possible by continued NSF investment in infrastructure at the South Pole.”

“The South Pole, a unique site that enables the world-leading science of CMB-S4 and IceCube-Gen2, must be maintained as a premier site of science to allow continued US leadership in these areas.”

# Status and Timeline



- This is our official technical driven timeline. We are being told its to optimistic, but so far there is no “realistic” alternative that NSF would agree to, either.
- CMB-S4 (construction planed for ~2028-32) is competing for resources and its currently unclear if both can be implemented simultaneously.
- There is some “re-scoping” potential, e.g. start with radio in Greenland and then move to the South Pole. But it’s to early to discuss the options.
- Even if optical construction at SP starts only 2032/33, we need to start preparing production ~5 years earlier, e.g. 2028. Radio could perhaps start earlier, but folks are busy with RNO-G until 26/27 as well.
- It seems we likely will have a few more years for R&D. Can we use it for our purposes?