

Advancing photon detection sensitivity of TES array

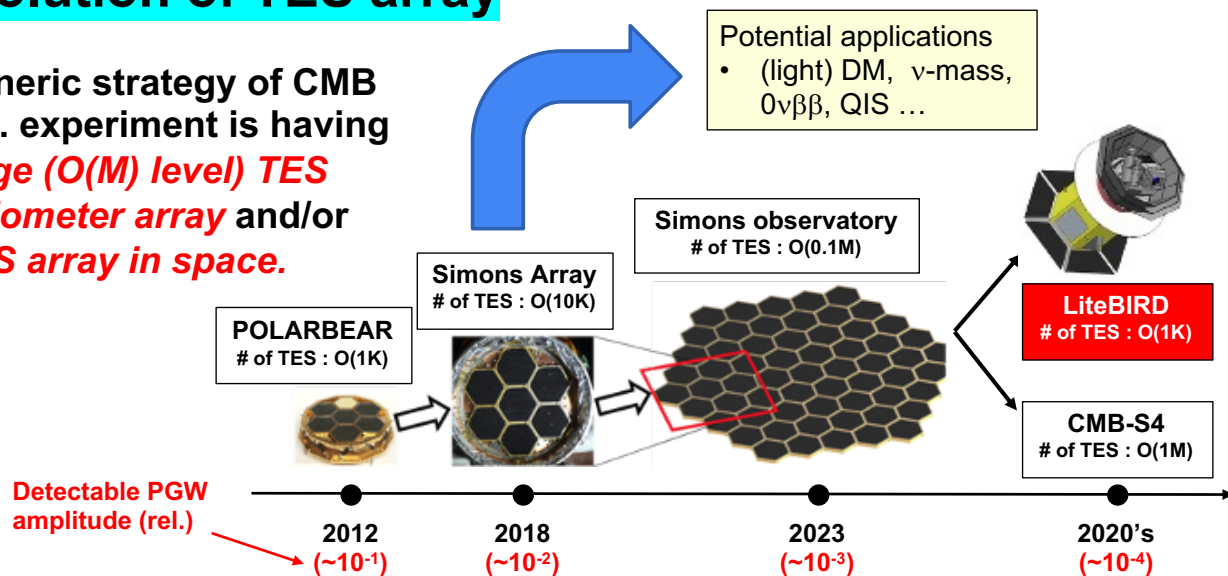
Masaya Hasegawa



Establishment of key technologies for realizing ultra low-noise and large superconducting detector arrays

Evolution of TES array

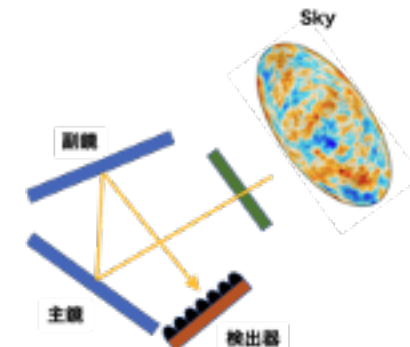
Generic strategy of CMB pol. experiment is having **large ($O(M)$ level) TES bolometer array and/or TES array in space.**



Mitigating Excess Noise

Mirror temperature (as an example)

- Additional polarization is induced at reflecting off the mirror
- If mirror temperature is fluctuated by $\sim 10mK\sqrt{s}$, the pol. amplitude is varied by $\sim 5\mu K\sqrt{s}$, leading it to the additional noise.



We need to monitor the warm equipment at the level of $1mK\sqrt{s}$. * Refined TOD process is also indispensable.

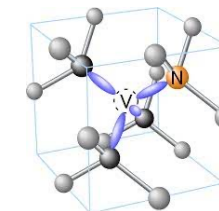
Key challenges towards 1M TES array

Project ①	Detector development and Fabrication
Project ②	Multiplexing readout
Project ③	Mitigating Excess Noise
Project ④	Processing large array data
Project ⑤	Characterization and QC

Adrian (+Masashi, Noriko & Kaori) lead

My target in QUP

Diamond censor (w/ NV center) is a promising candidate.



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*Beating excess noise is one of biggest challenges for next gen. CMB experiment, and we will realize it by applying **control engineering technique** and **ultra-high sensitive (quantum) sensors**.*