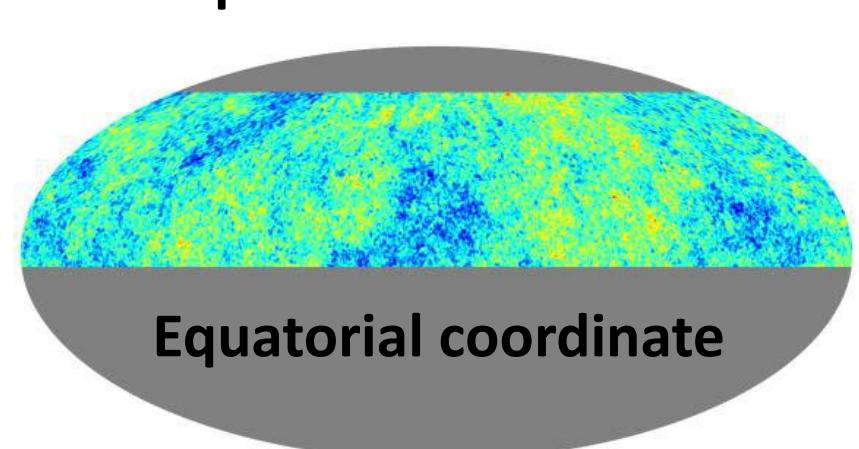
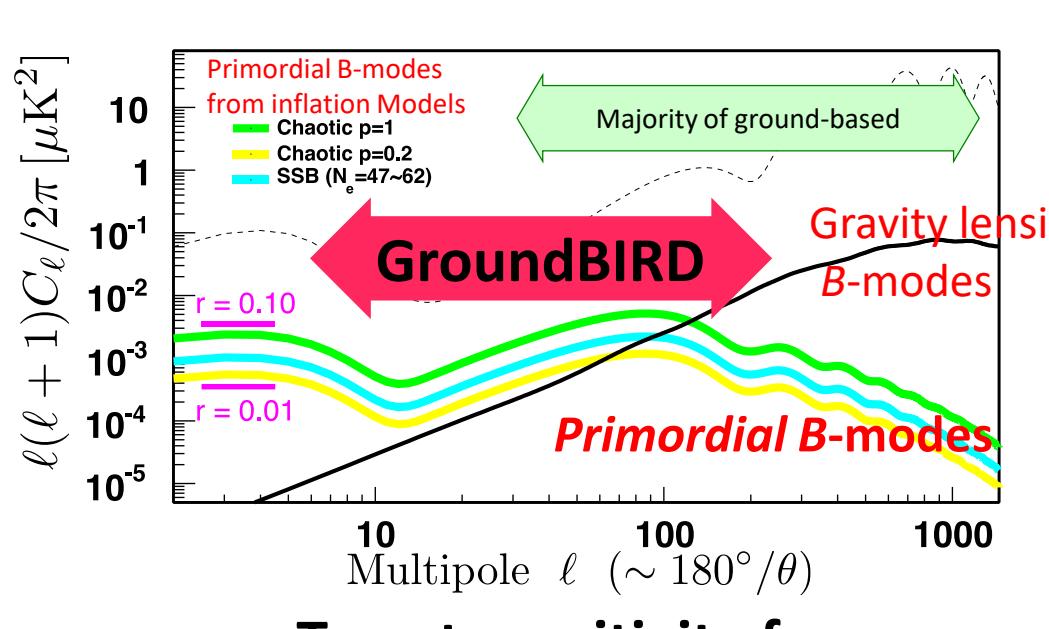


# GroundBIRD : A CMB Polarization experiment with MKID arrays

Kyungmin Lee<sup>1</sup>, Jihoon Choi<sup>2</sup>, Ricardo T. Génova-Santos<sup>3,4</sup>, Makoto Hattoni<sup>5</sup>, Masashi Hazumi<sup>6,7</sup>, Shunsuke Honda<sup>8</sup>, Takuji Ikemitsu<sup>8</sup>, Hidesato Ishida<sup>5,9</sup>, Hikaru Ishitsuka<sup>7</sup>, Yonggil Jo<sup>1</sup>, Kenichi Karatsu<sup>10</sup>, Kenji Kiuchi<sup>11</sup>, Junta Komine<sup>8</sup>, Ryo Koyano<sup>12</sup>, Hiroki Kutsuna<sup>5,9</sup>, Satoru Mima<sup>9</sup>, Makoto Minowa<sup>11</sup>, Joonhyeok Moon<sup>1</sup>, Makoto Nagai<sup>13</sup>, Taketo Nagasaki<sup>9</sup>, Masato Naruse<sup>12</sup>, Shugo Oguri<sup>9</sup>, Chiko Otani<sup>9</sup>, Michael Peel<sup>3,4</sup>, Rafael Rebolo<sup>3,4</sup>, José Alberto Rubiño-Martín<sup>3,4</sup>, Yutaro Sekimoto<sup>14</sup>, Junya Suzuki<sup>8</sup>, Tohru Taino<sup>12</sup>, Osamu Tajima<sup>8</sup>, Nozomu Tomita<sup>11</sup>, Tomohisa Uchida<sup>6,7</sup>, Eunil Won<sup>1</sup> and Mitsuhiro Yoshida<sup>6,7</sup>

## The GroundBIRD

### 1. Purpose

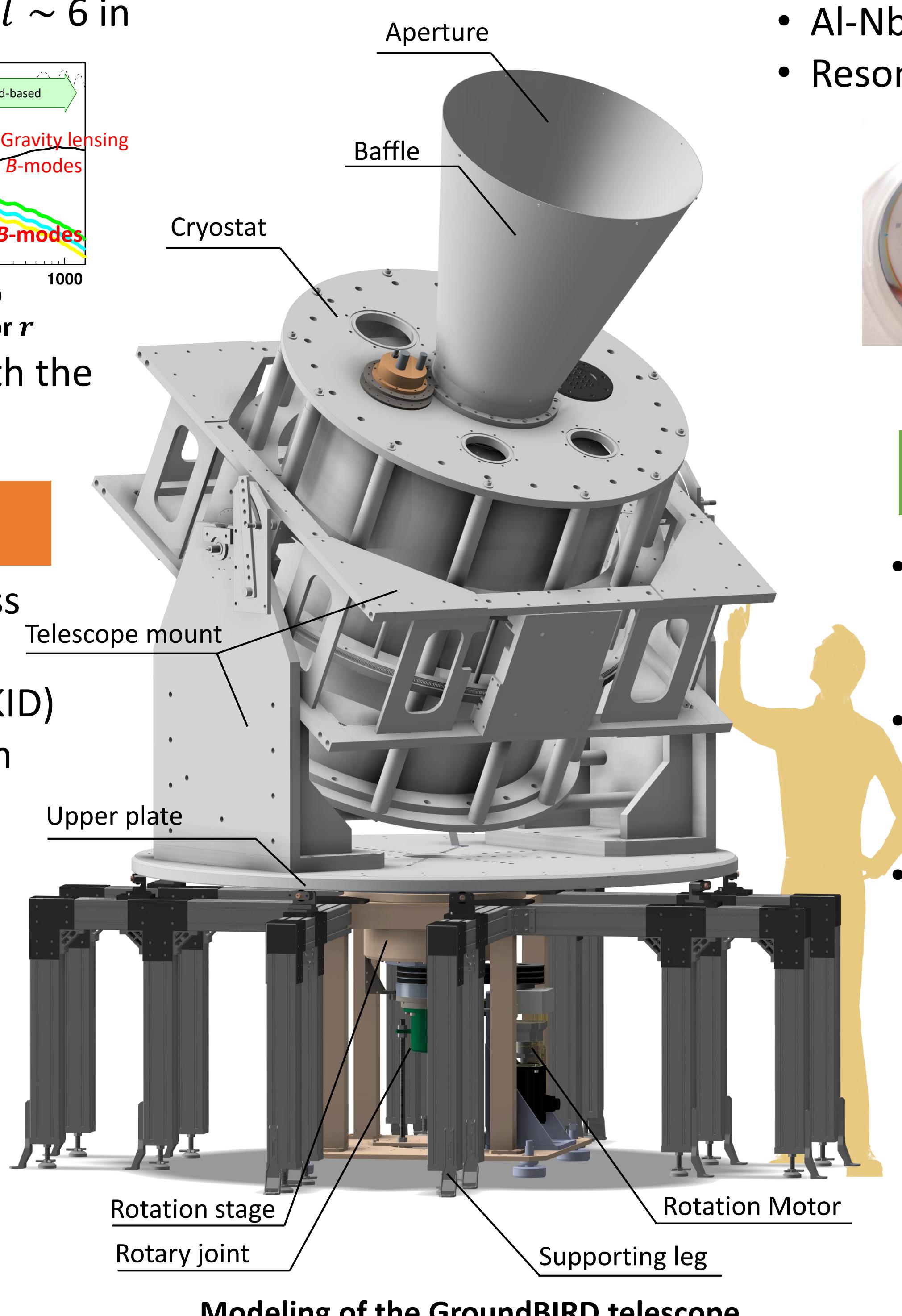
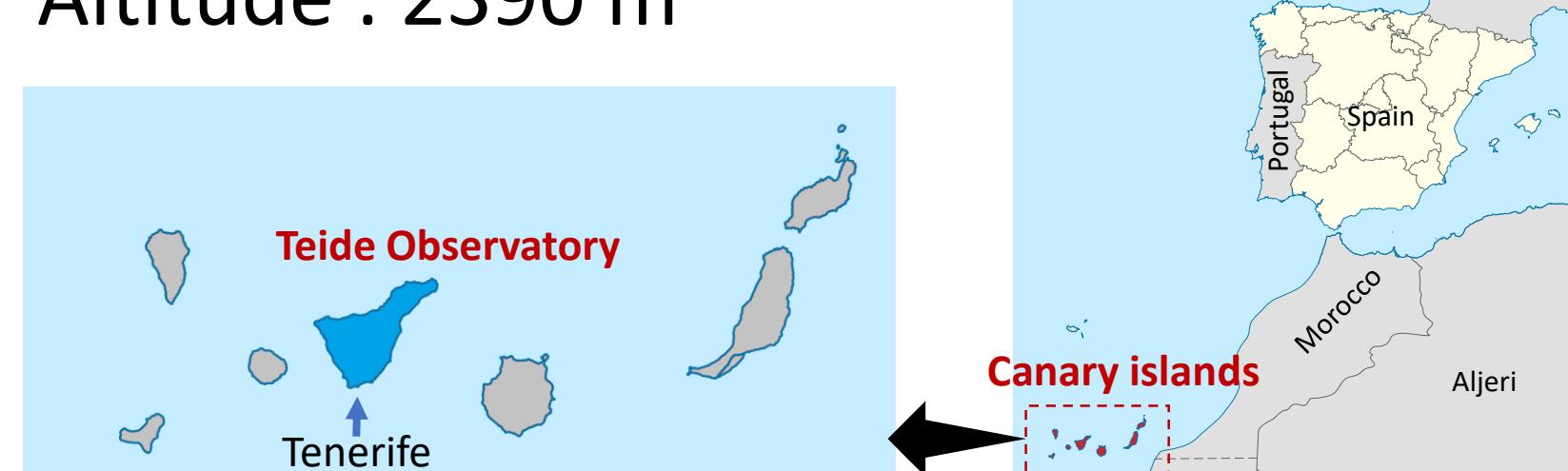
- Observation of the CMB polarization and foreground at two target frequencies : 145 and 220 GHz.
- Large sky coverage of about 40 % of full sky,  $l \sim 6$  in multipole moment.
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- 
- Measurement of tensor-to-scalar ratio  $r$ , with the target sensitivity of  $\sigma_r < 0.01$ .

### 2. Features

- Fast rotation scanning at 20 RPM to suppress  $1/f$  noise
- Microwave Kinetic Inductance Detector (MKID)
- Cold optics to reduce thermal emission from the surface of reflectors

### 3. Location

**Teide Observatory,**  
Tenerife, Canary islands, Spain  
Coordinate :  $16^{\circ} 30' W, 28^{\circ} 18' N$   
Altitude : 2390 m



## Status

### 1. Installation of telescope

- The dome was installed at Teide observatory in November 2018.
- The rotation table was installed inside the dome in June 2019.

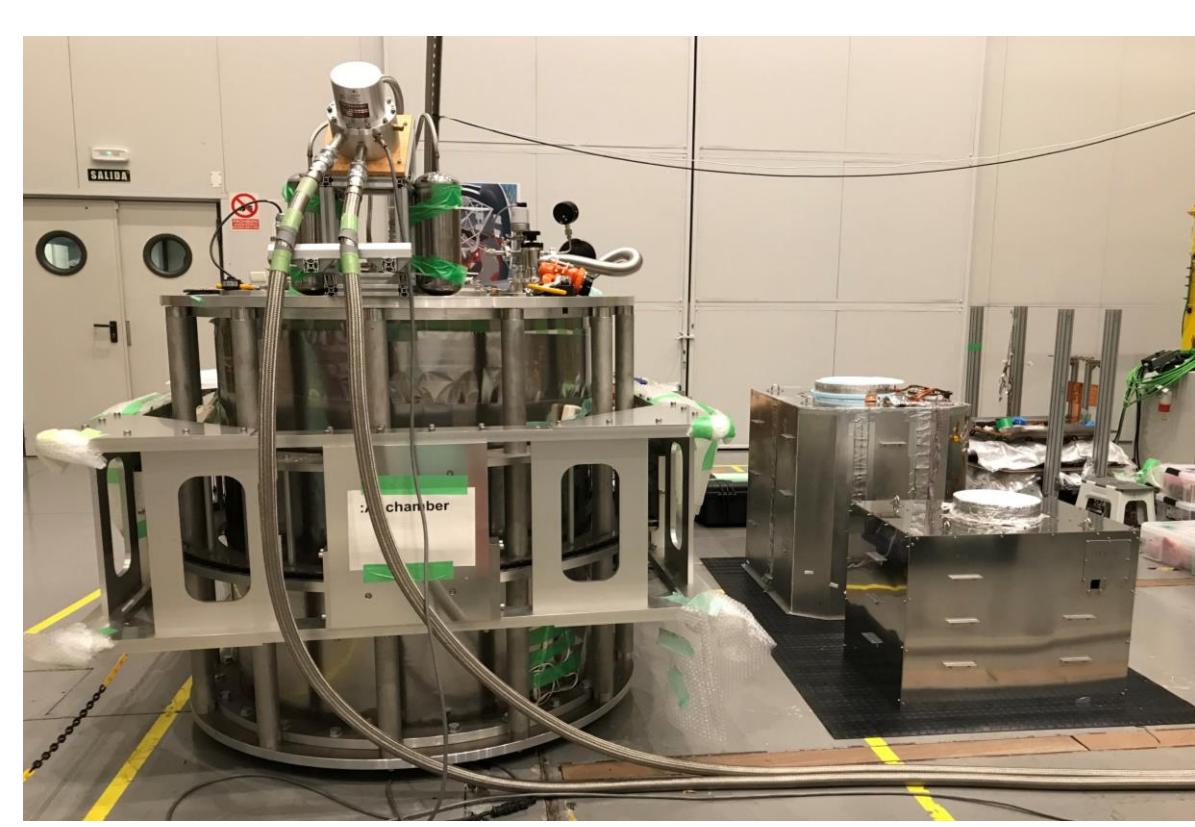


The dome at Teide

Rotation table

### 2. Test of cryostat

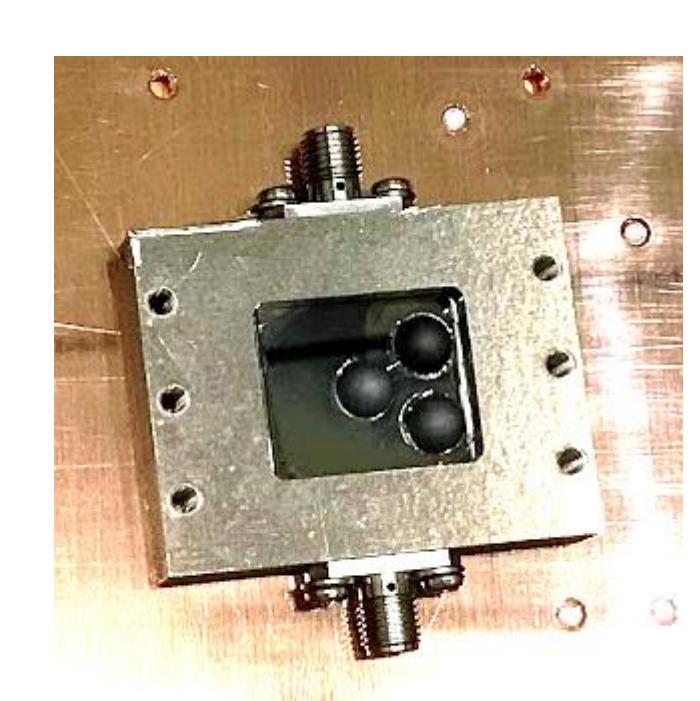
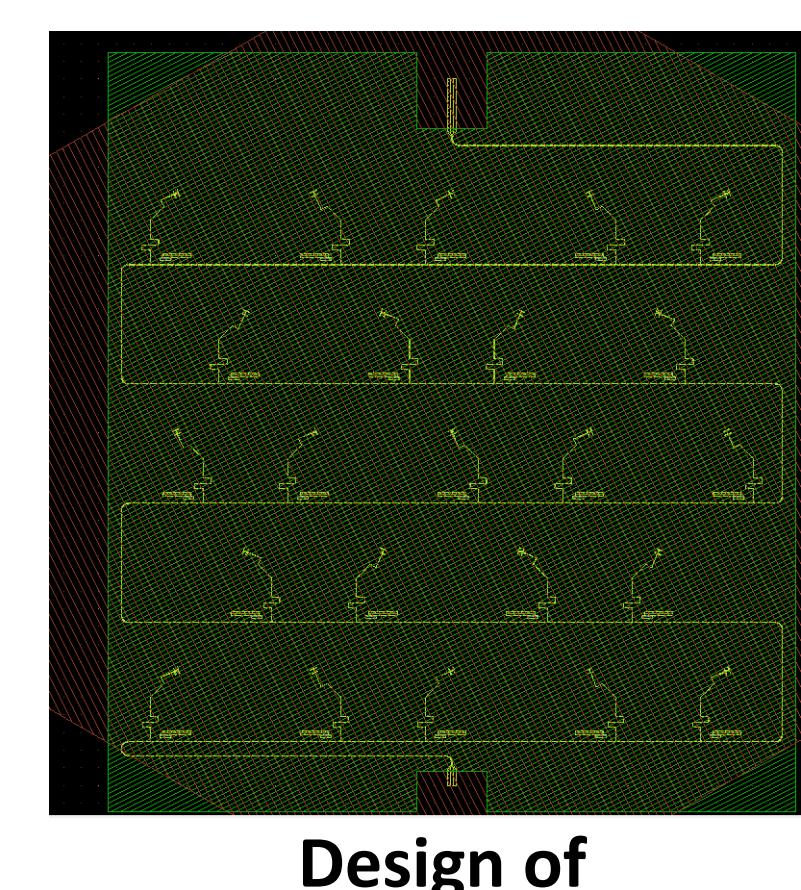
- The cryostat and the detectors are under test in Instituto de Astrofísica de Canarias (IAC).
- We have tested PTC without thermal load, and it works with no problem.



The GroundBIRD cryostat under test

### 3. MKID

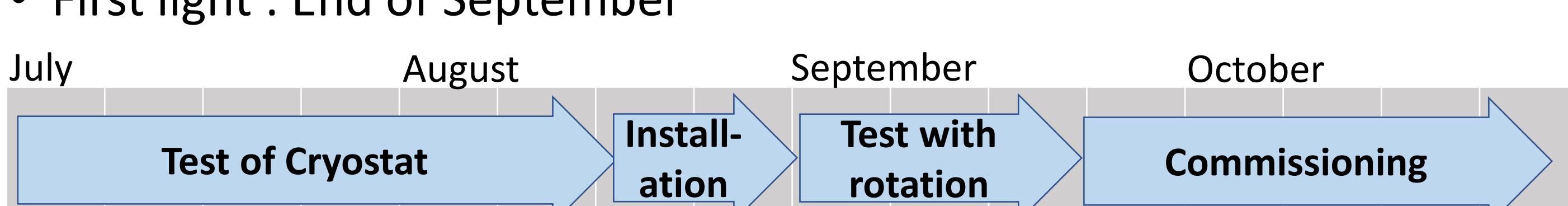
- We have fabricated a test version MKID.
- It is a simplified version that has single polarization antenna coupled with a lenslet.
- This version will be used for the first light.



Design of the test version MKID with 3 pixels

## Plan

- Test of cryostat : by Mid-August
- Install telescope at Teide Observatory : End of August
- Test of telescope with rotation : September
- First light : End of September



## GroundBIRD Collaboration

- <sup>1</sup>Korea University, <sup>2</sup>IBS, <sup>3</sup>IAC, <sup>4</sup>Universidad de La Laguna,  
<sup>5</sup>Tohoku University, <sup>6</sup>KEK, <sup>7</sup>Sokendai, <sup>8</sup>Kyoto University, <sup>9</sup>RIKEN,  
<sup>10</sup>TU Delft, <sup>11</sup>University of Tokyo, <sup>12</sup>Saitama University, <sup>13</sup>NAOJ, <sup>14</sup>JAXA



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