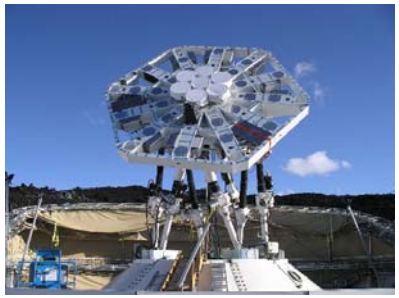
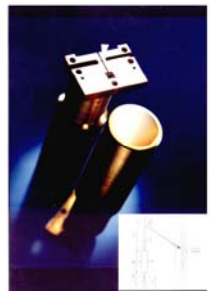
SMA-Taiwan Status

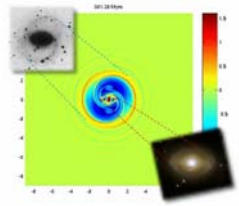
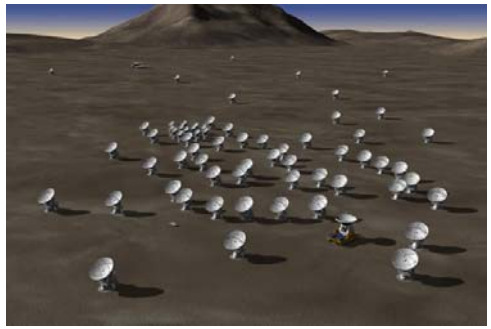
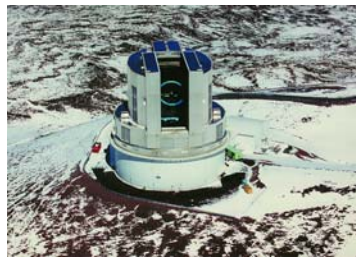
Paul Ho

SMA: 1st MAJOR IAA PROJECT

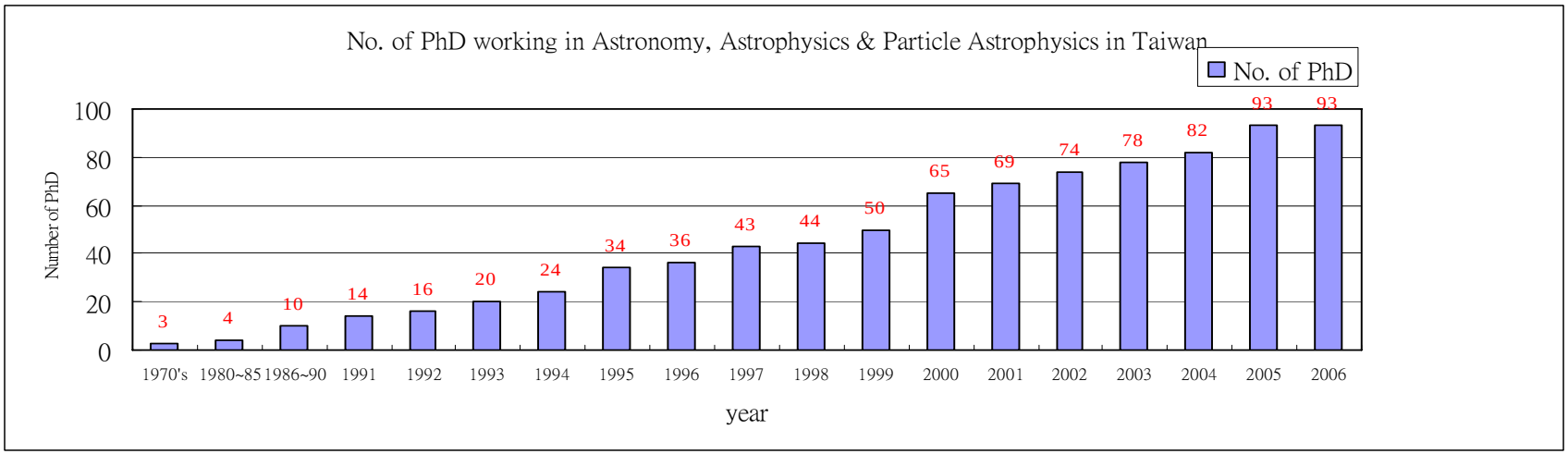



SAO	•	**SMA : Array Completed, Upgrading**
NTU	•	**AMiBA : 7-element Dedicated, 13-element underway**
NTHU	•	**TIARA; SIS Junction : 230, 345, 400, 690, 900 GHz (NAOJ, PMO)**
NCU	•	**TAOS : 4 Telescopes Working; Moving?**
ASIM	•	**CFD-MHD : 2-D Hydro Codes**
CFHT	•	**WIRCam : Working well on Telescope**
NAOJ	•	**ALMA-J : FEIC started; band-10**
NRAO	•	**ALMA-NA: Funded, Negotiating**
NAOJ	•	**Hyper Suprime Cam: Proposing**
NTU	•	**ASMAB: on schedule to finish 2008**

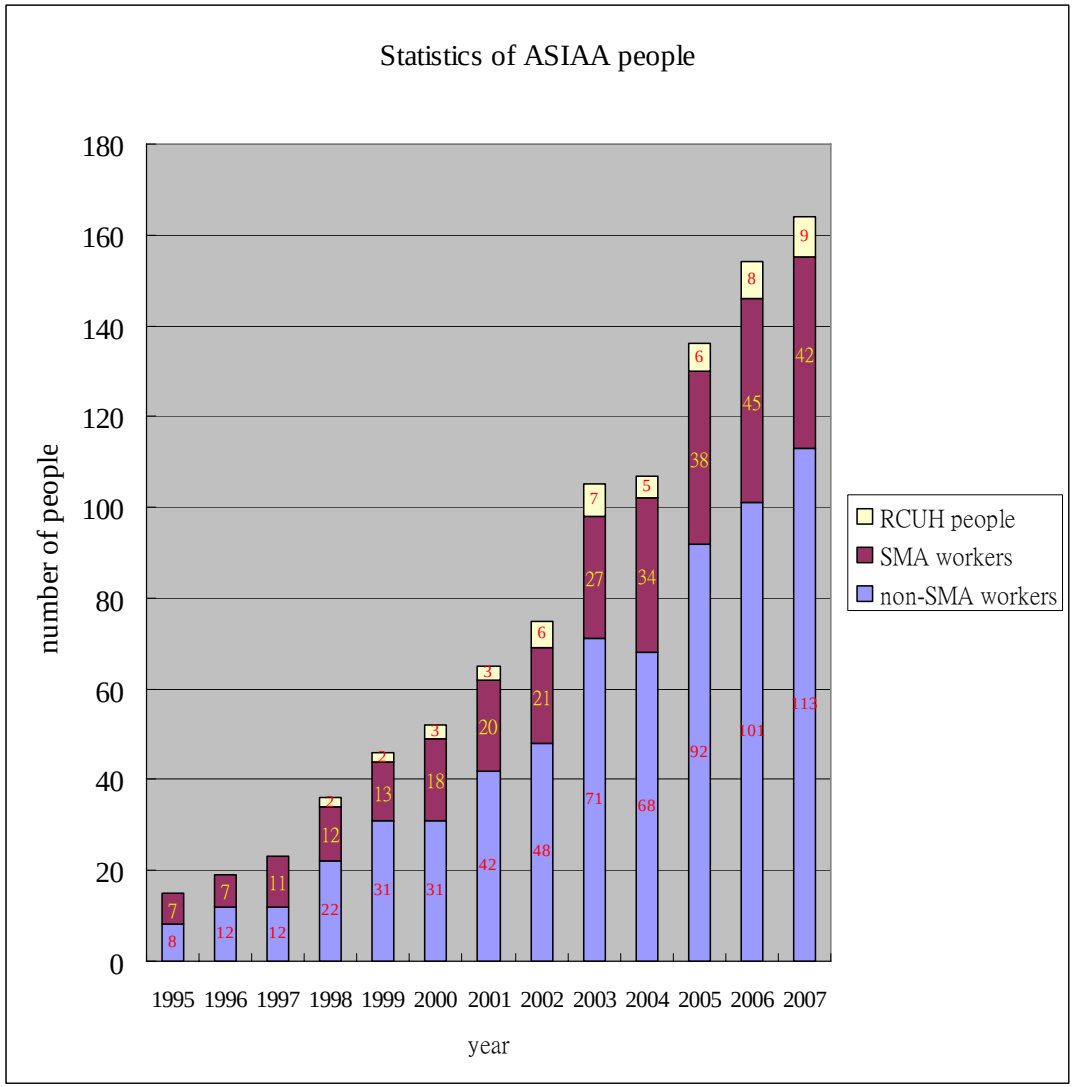




Growth of Taiwan Ph.D. Astronomers

Driven in large part by SMA-Taiwan Project



SMA Effort Within IAA



SMA PERSONNEL at IAA

- **15/27 ASIAA Faculty (21 Regular, 6 Research)**
- **3/10 Adjunct Faculty, 2/9 Visiting Scholars**
- **7/19 Postdoctoral Fellows**
- **6/14 Ph.D. Students, 3/15 Master Students**
- **4/9 Undergraduate Students, Assistants**
- **23/36 Technical Staff**
- **2/20 Administrative Staff**

Working Language: English
Staff: Australia, Canada, China, France, Germany, India, Japan, Spain, Switzerland, Taiwan, U.S., Vietnam

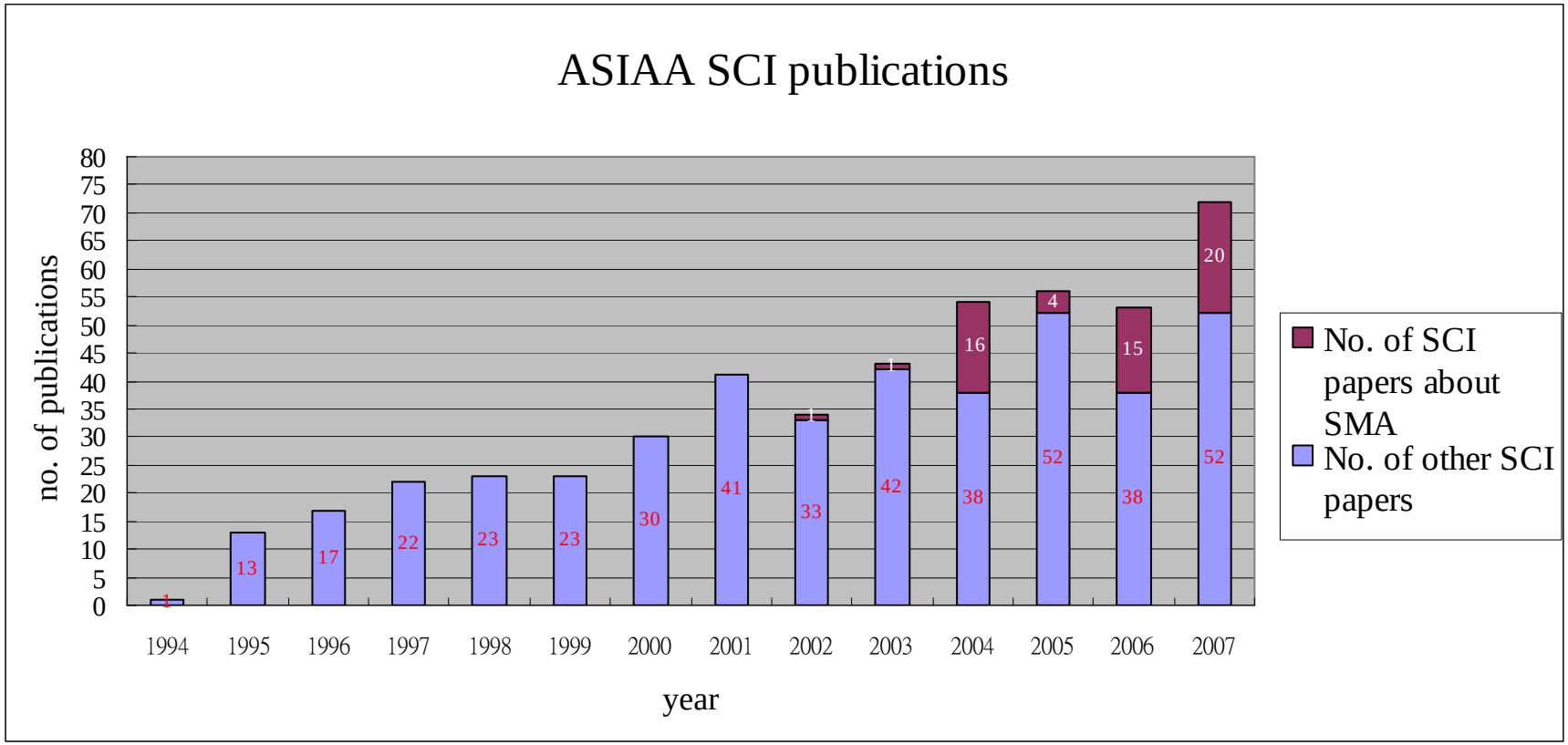
SMA Operational Support

- At Hawaii (1st shift)
  - 2005; 94 man-nights (12.9 %)
  - 2006; 100 man-nights (13.7 %)
  - 2007 (as of end of Aug); 76 man-nights
- At Taiwan (2nd shift; 2 people for each shift)
  - 2005; 58 nights
  - 2006; 85 nights
  - 2007 (as of end of Aug); 35 nights

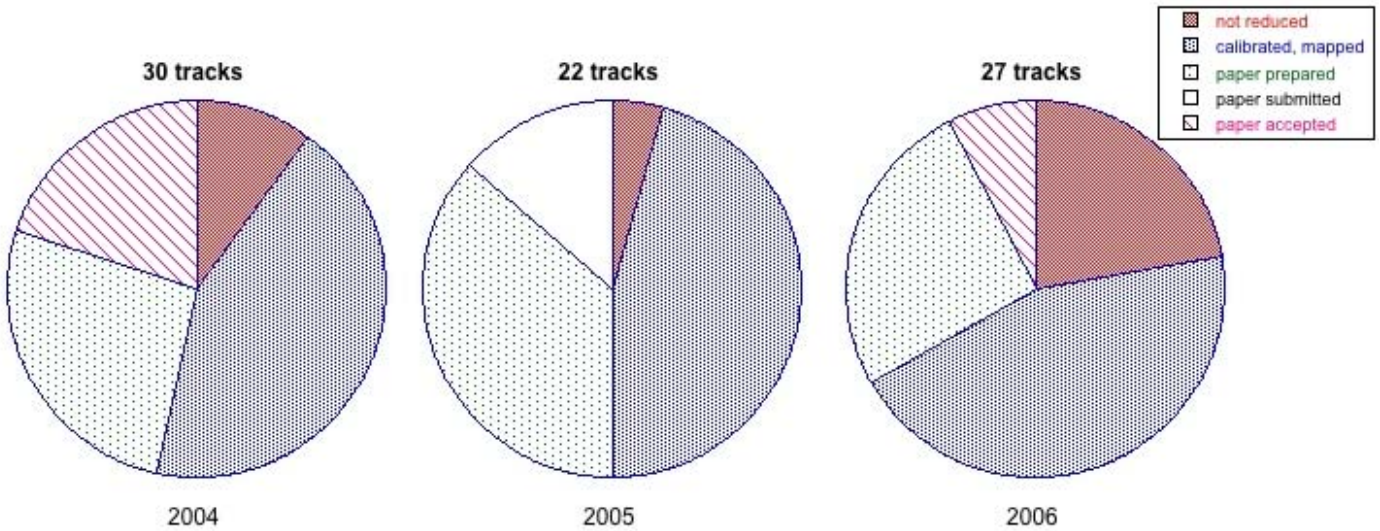
SMA Hilo Support

- Ming Tang Chen (Receiver, Operations)
- Derek Kubo (Microwave Engineering)
- Ramprasad Rao (Receiver Engineering)
- Peter Oshiro (Electrical Technician)
- Kevin O'Connell (Mechanical Technician)
- John Cheng (Computing Support)
- Brian Koge (Electrical Technician)
- Debbie Kenui (Administrative Support)
- Sara Steele (Administrative Support)

SMA Science central to IAA

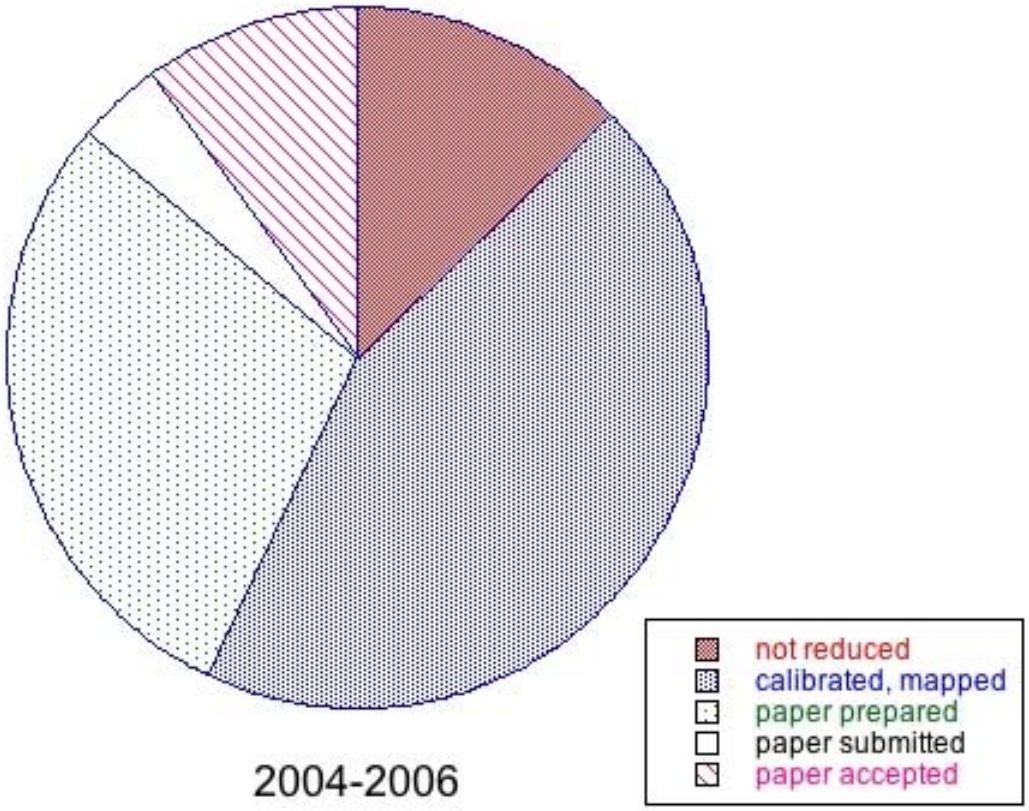


Status of SMA-Taiwan Projects

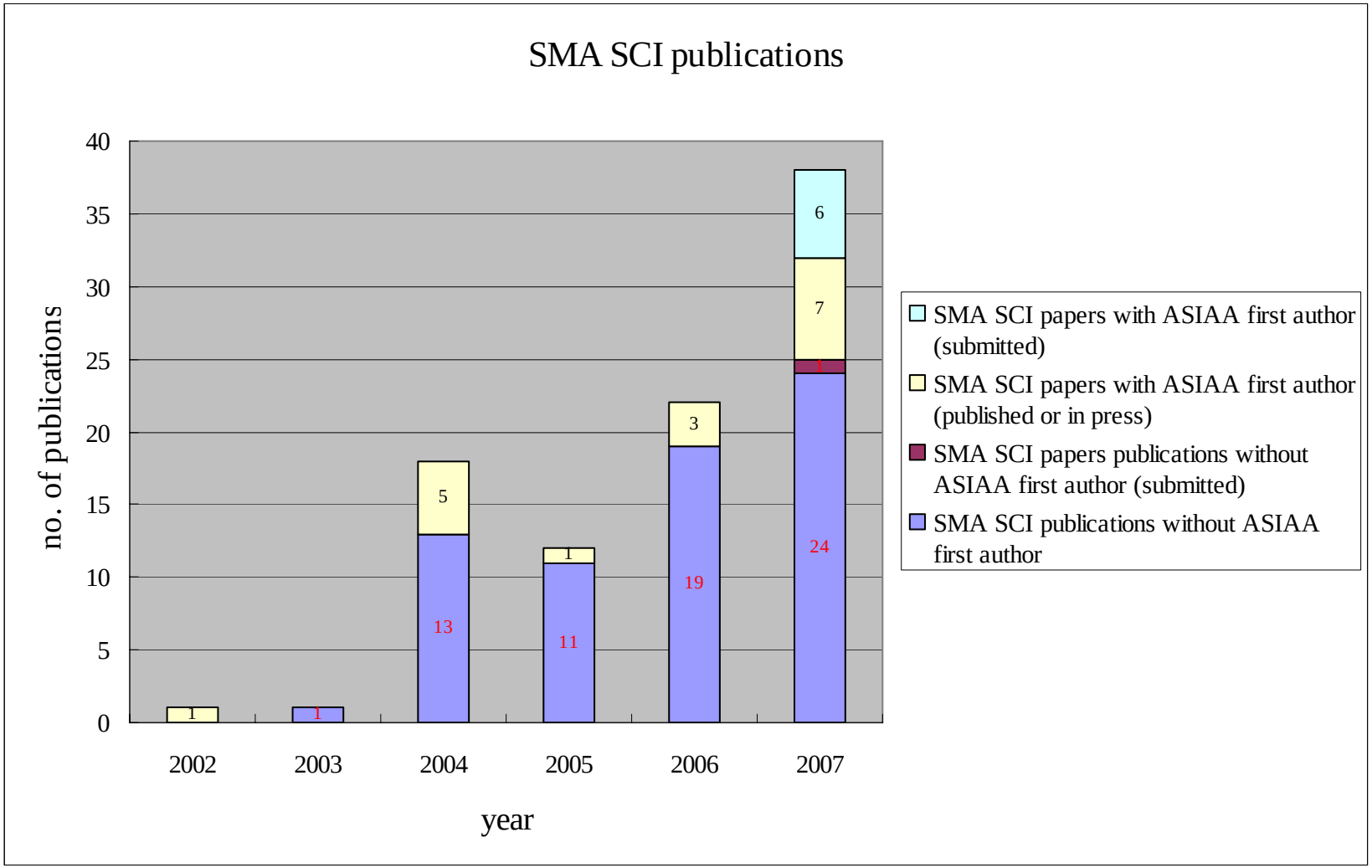


Status of SMA-Taiwan Projects

79 tracks; 8 papers published/accepted, 3 papers submitted



SMA-Taiwan Publications



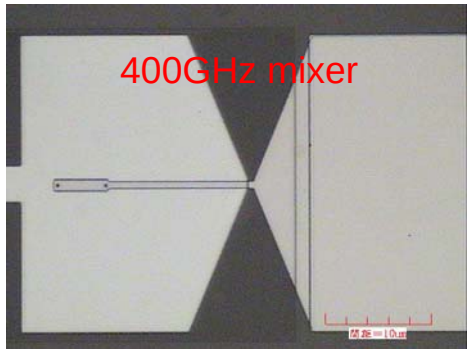
SMA-Taiwan Efforts 2007

- Upgrade SMA-7,8 Performance
- Deliver 400 GHz Receivers
- Support and Improve Hilo Operations
- Solve some SMA calibration problems
- Junction developments at 900GHz
- Upgrade Junction Fabrication Facilities
- Increase SMA science staff
- Increase SMA research students

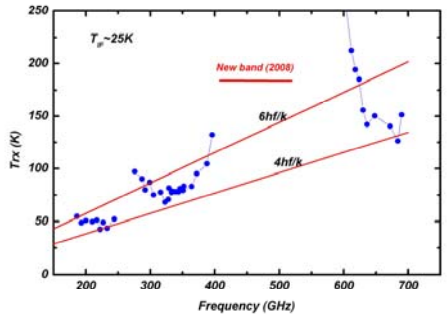
SIS Mixer Development 2007

New clean room at NTHU

NiB SMA mixers



Performance of all SMA mixers



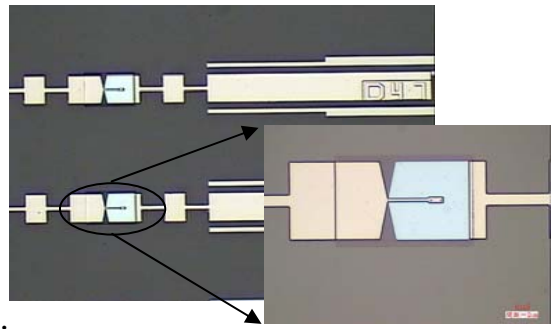
ALMA Band 10 mixer

SMA type mixer – fabricated and tested at IAA (cooling problem of chip)

NAOJ type mixer – fabricated at IAA and tested at IAA and NAOJ

Nb-junction with Nb/SiO2/Al transmission line

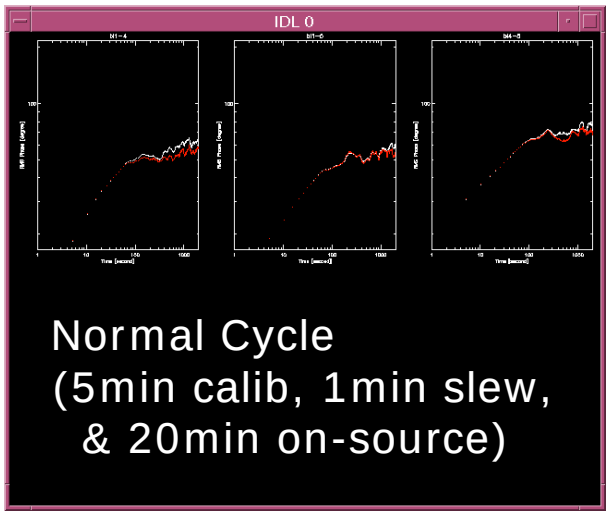
~500K@810GHz and ~1200K@900GHz (loss of transmission line)

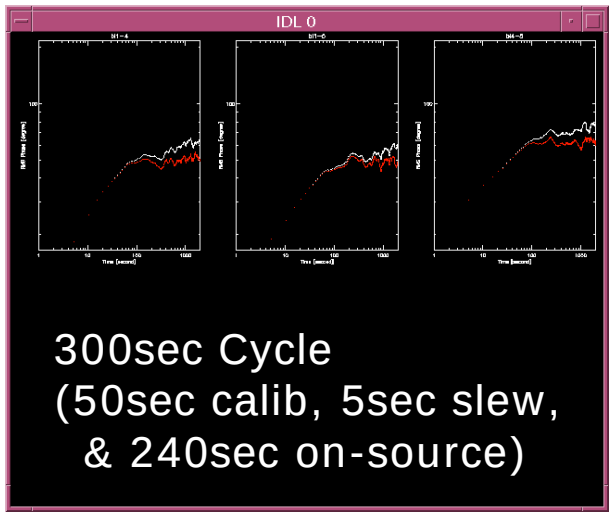


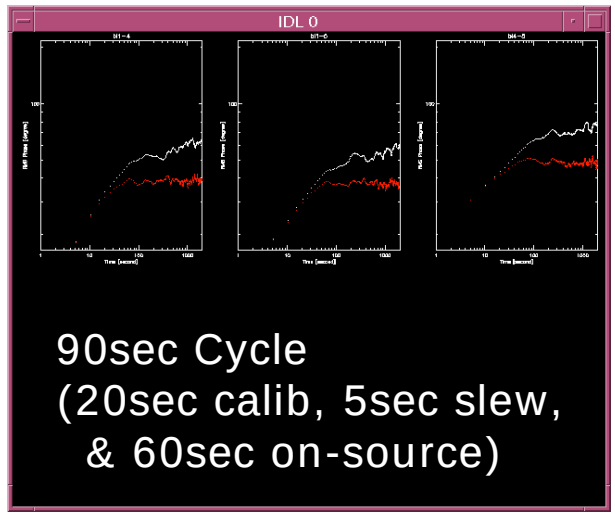
Fast Switching Phase Calibration

- Simulation 1
  - 3C454.3, 2 hrs data, 219GHz, bl~100m
    - Temporal structure function plots
  - Phase fluctuation decreases with shorter switching timescale.

White lines: Original data, Red lines: Calibrated data



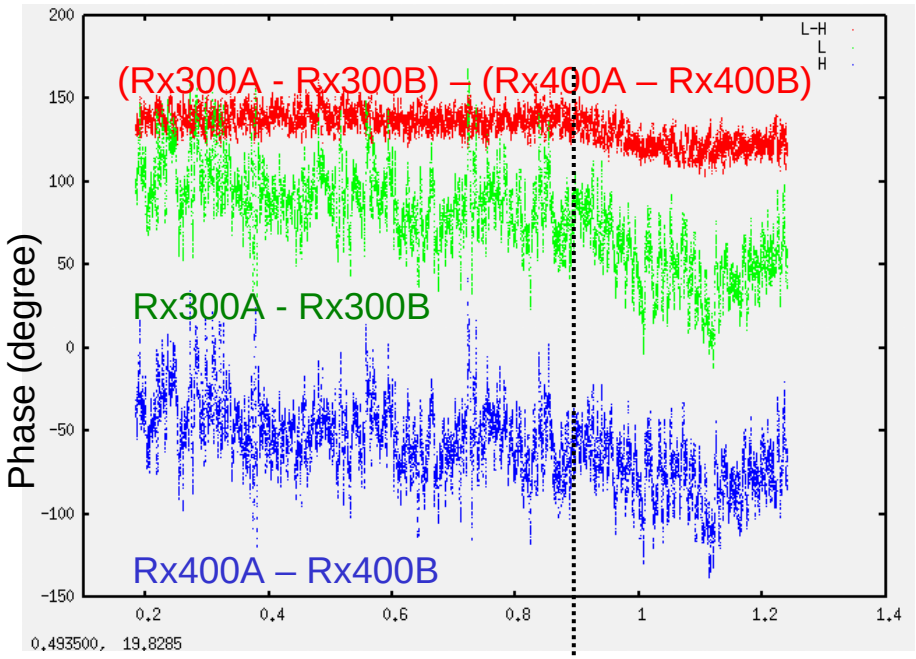




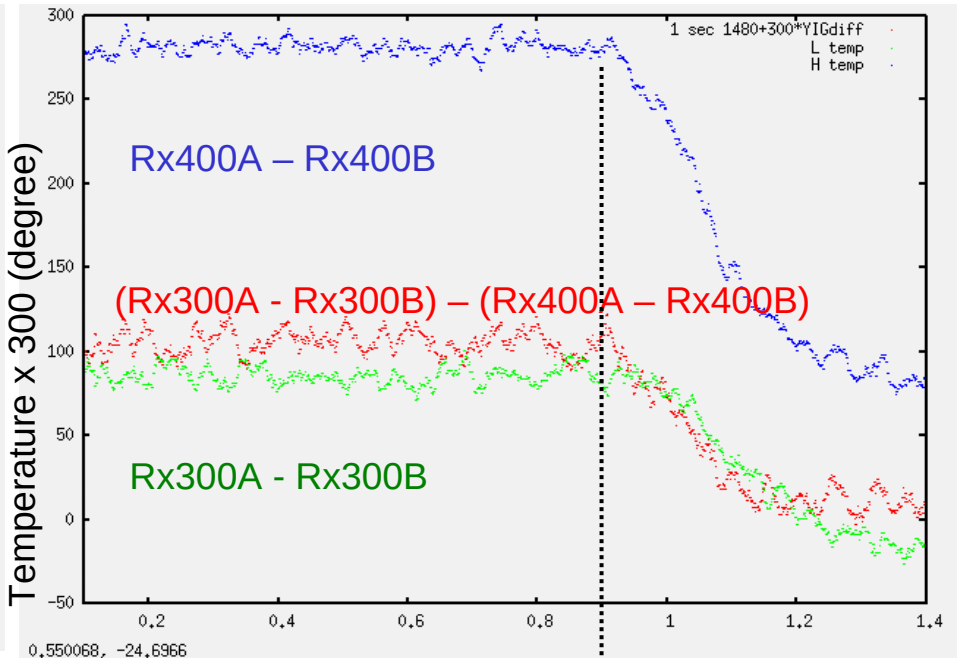
Dual Receiver Beacon Test

- Possible cause (1):
  - Difference in YIG temperature
  - Test:
    - Opened IF/LO box cover (which usually warmer than cabin temperature) at ~0.9 hr.

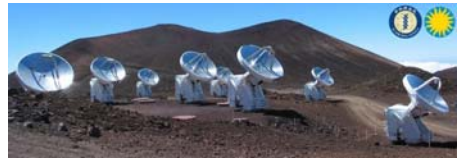
Phase fluctuation

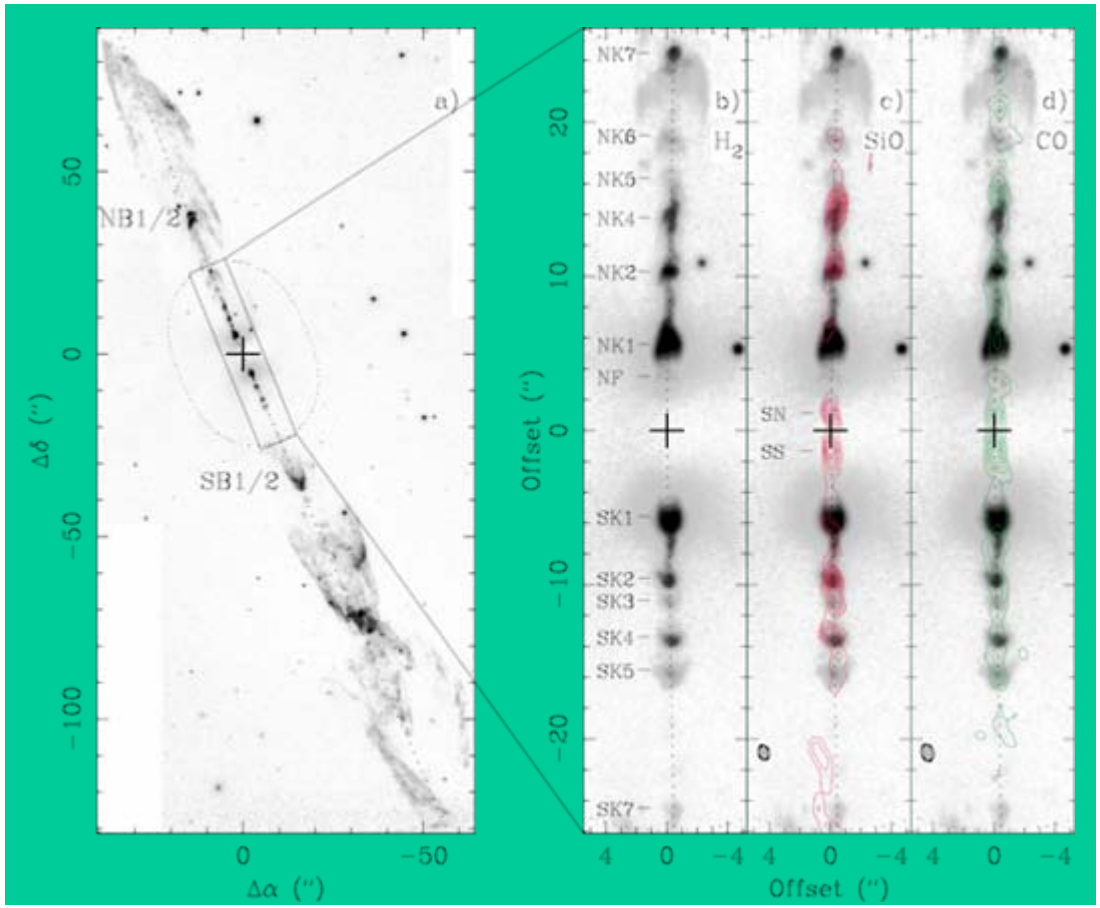


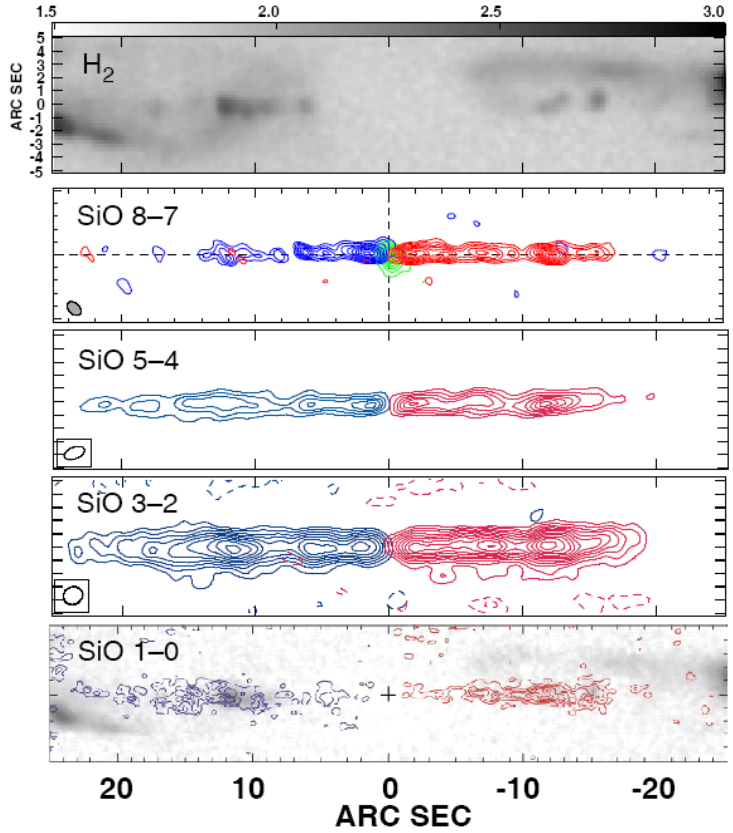
YIG Temperature



SMA-Taiwan 2007







HH212 H_2, SiO, CO

HH211 H_2 SiO