Current Status of KVN

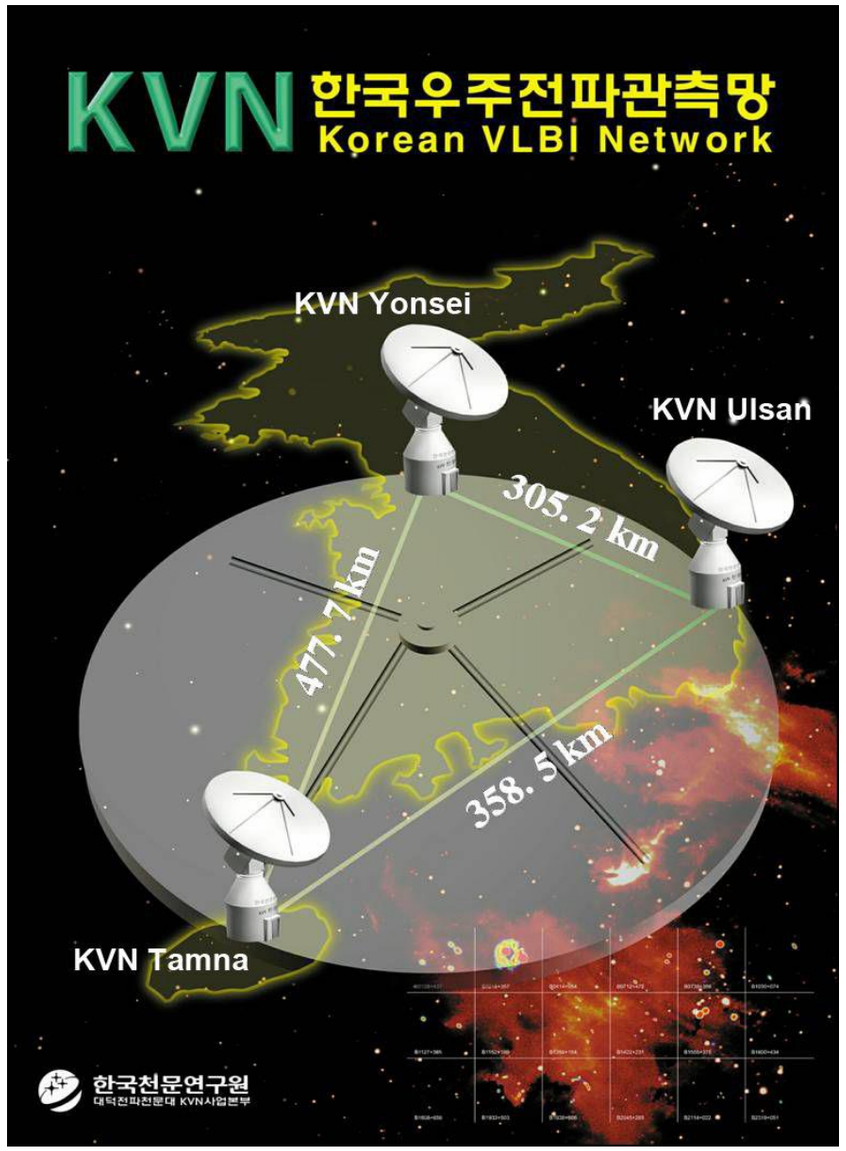
Chungsik Oh (KASI)
VERA User's Meeting 2017 @ Mizusawa

Outline

- Operation in 2016 and 2017
- New Capabilities
- Upgrade Activities
  - Wideband Backend
  - Wideband Receiver Project
  - pre-study of Extended KVN

KVN and KaVA(KVN and VERA Array)

KVN 22/43/86/129GHz
θ ~ 1-6 mas



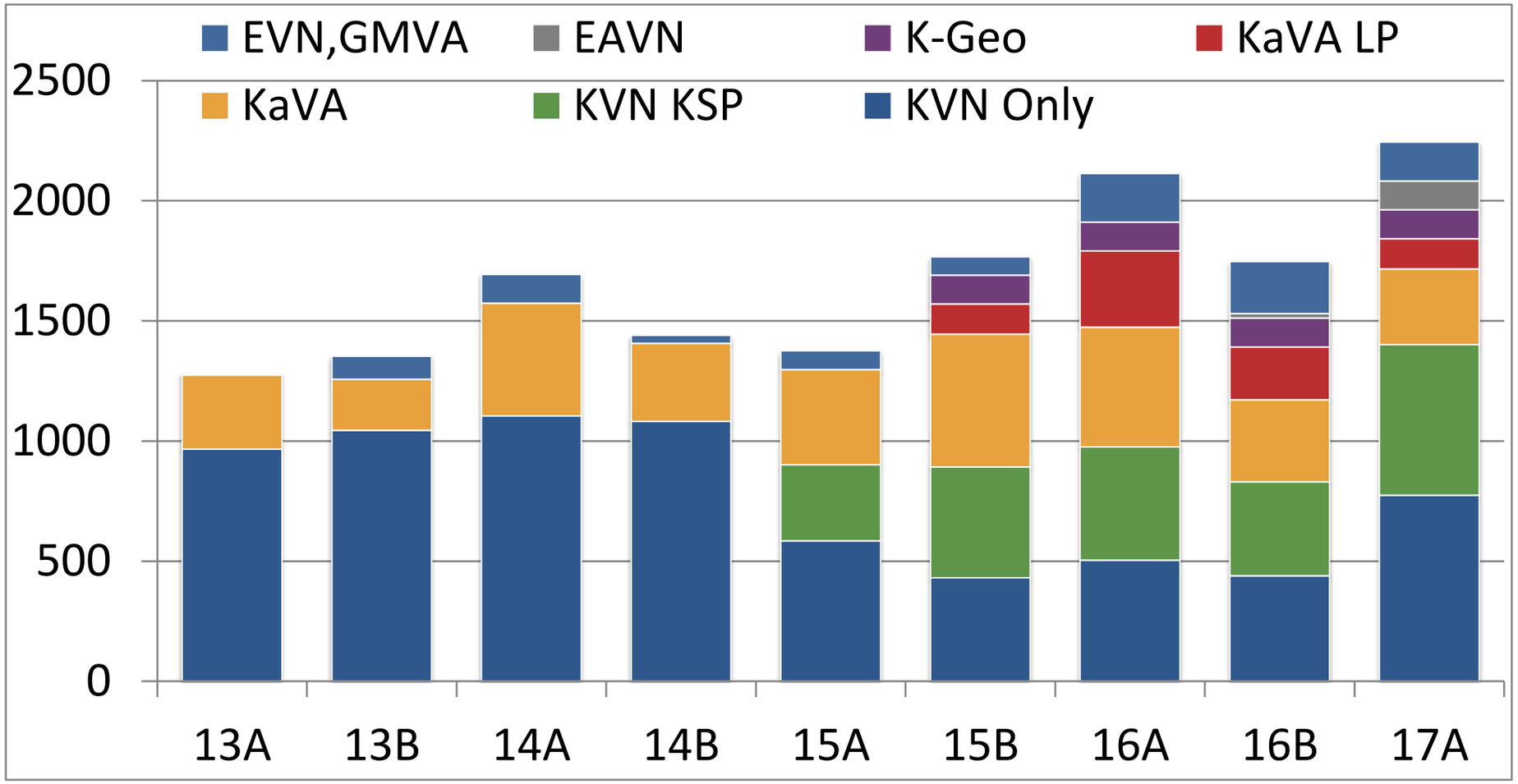
KaVA (KVN and VERA Array)
22/43(/86/129)GHz , **θ** ~ 0.5-1 mas





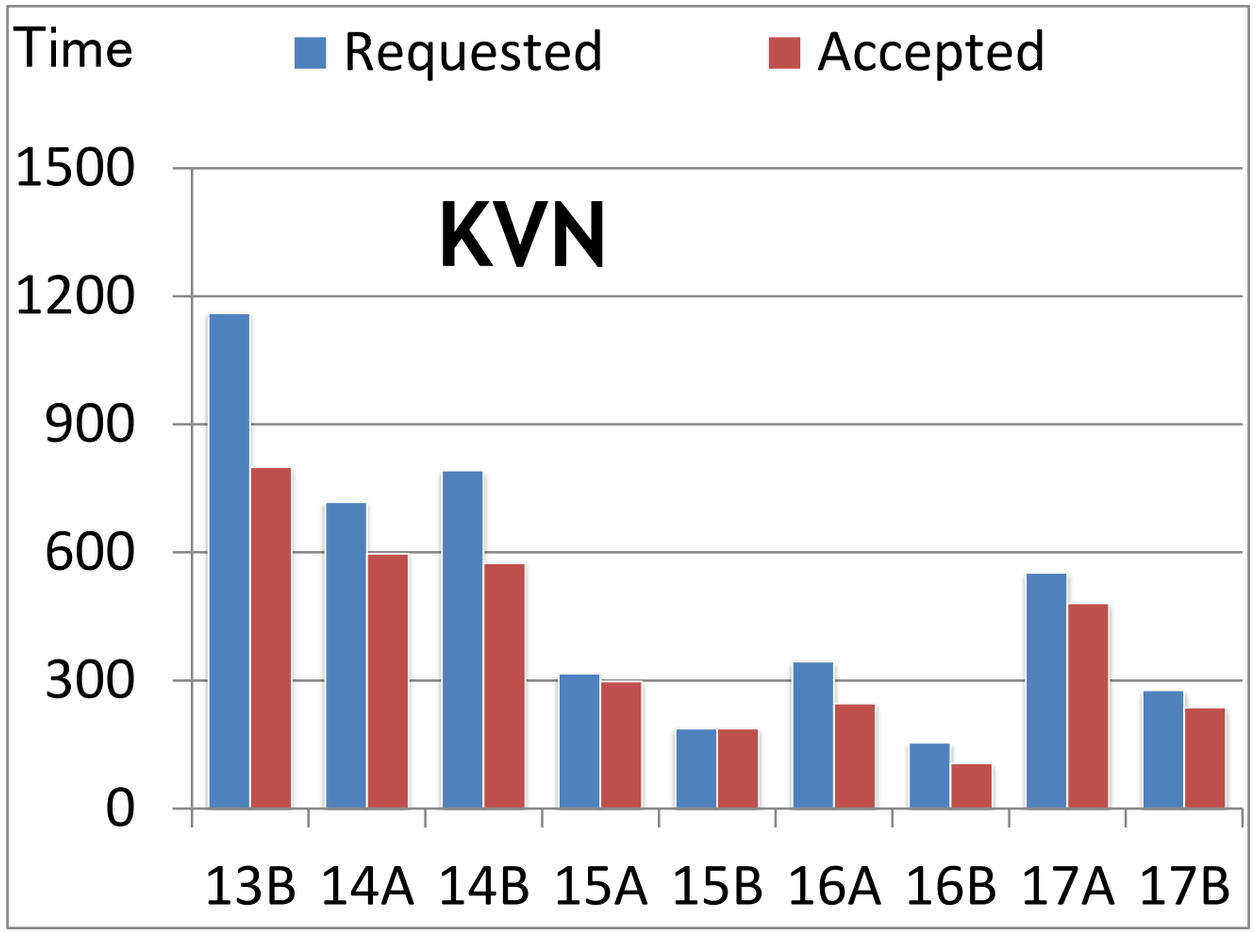


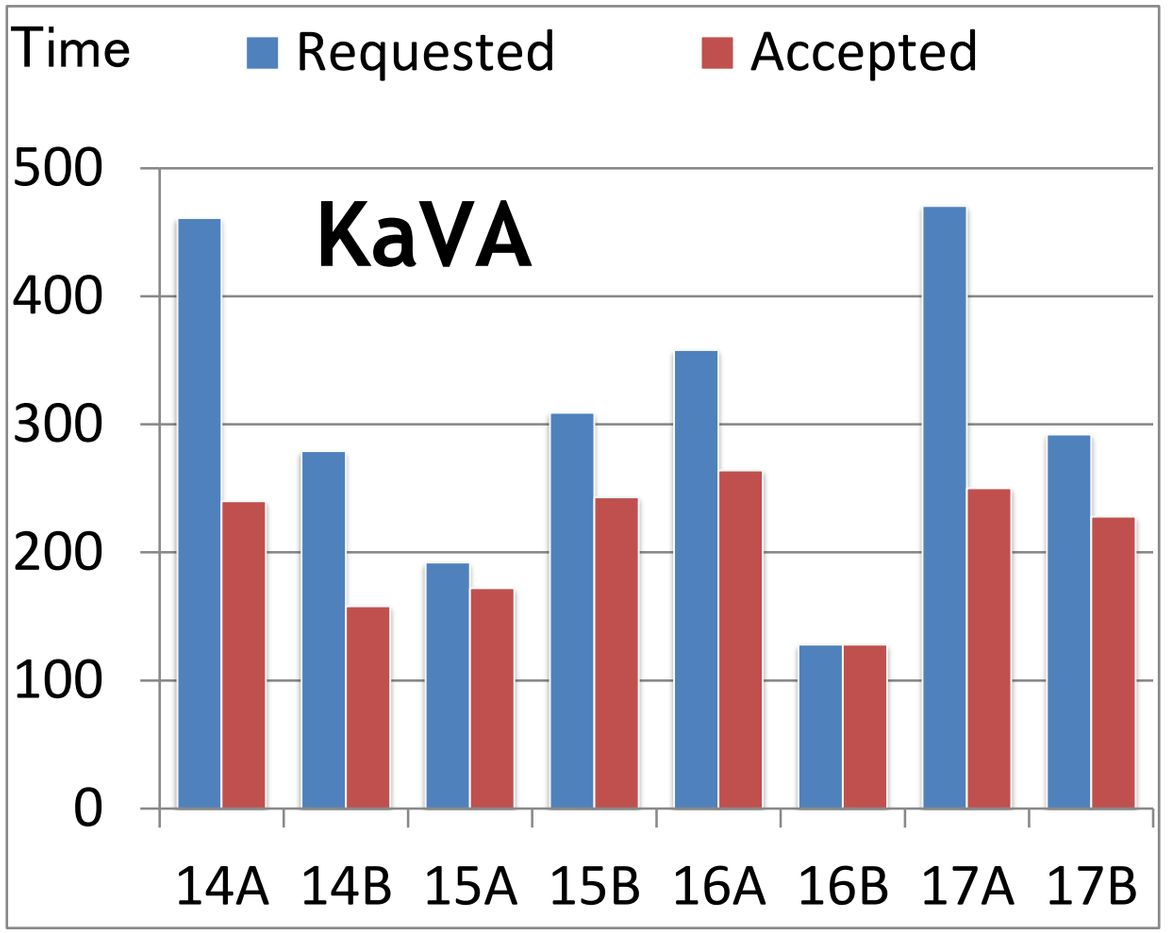
Operation Summary in 16B & 17A



- VLBI ~ 4000h / yr　(~2000 h in 17B)
- KVN Key Science , KaVA Large Program from 2015
  - + PaGAN (KSP), MASK, ToO
- EAVN, EVN 22/43GHz + GMVA 86GHz > 300h / yr

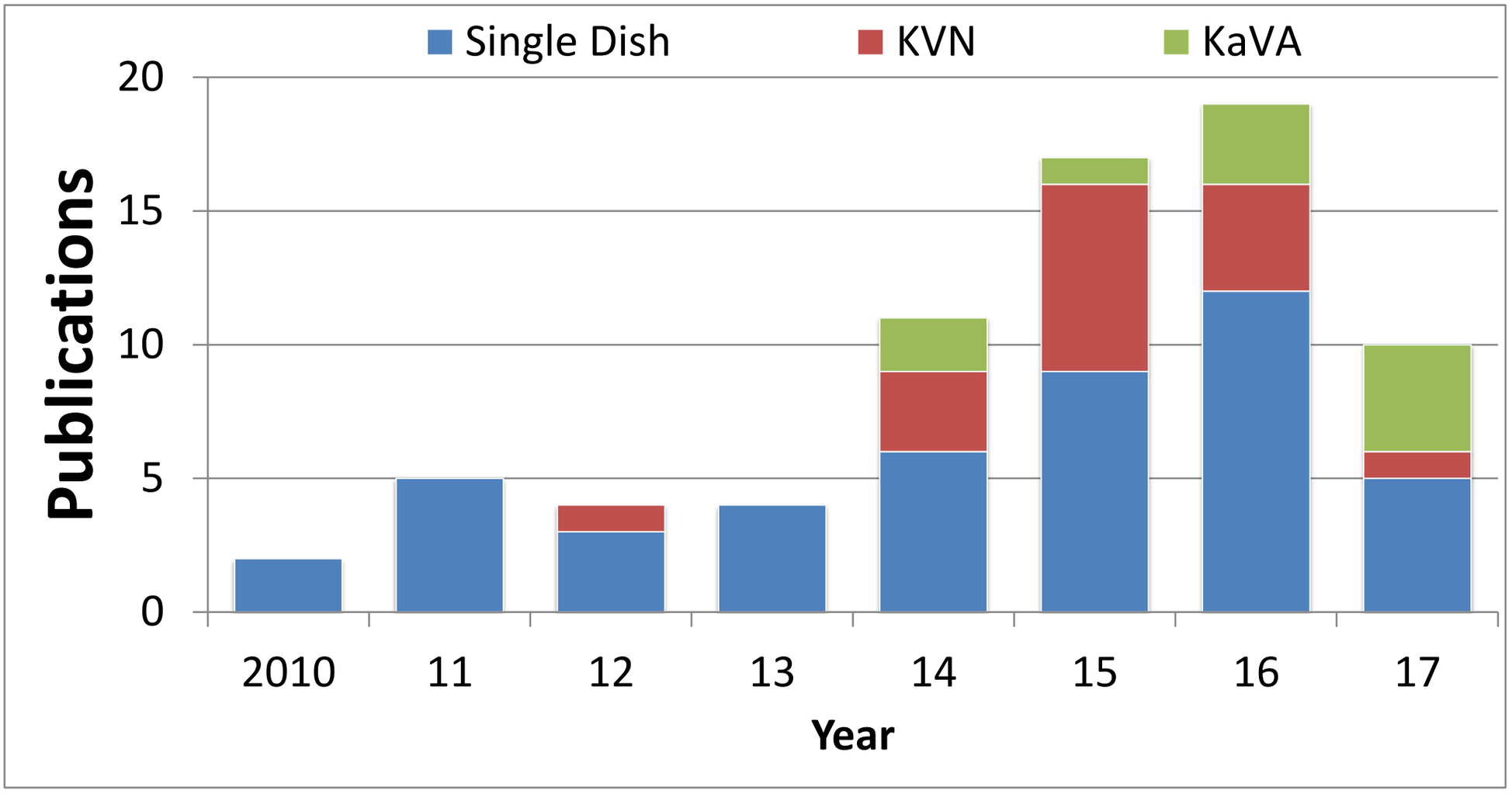
Common Use Observations





- KVN ~ 300h, KaVA ~ 250 h / semester
  - Proposal Deadline : Jun 1 (B) & Nov 1 (A)
  - Global Open (KVN S/D Domestic Only)
- Target of Opportunity, KVN Filler Proposal (< ~8h)

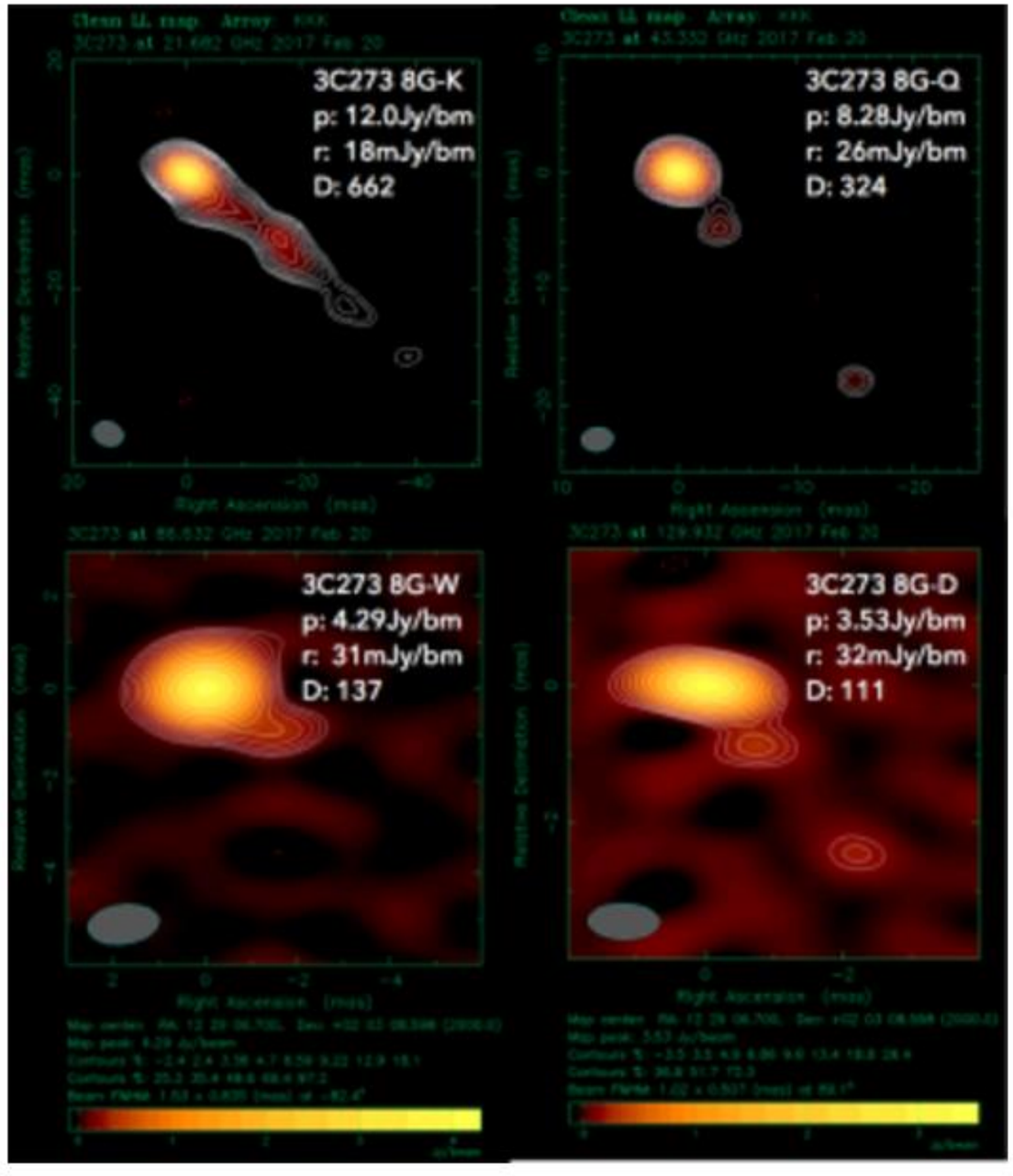
SCI(E) Publications

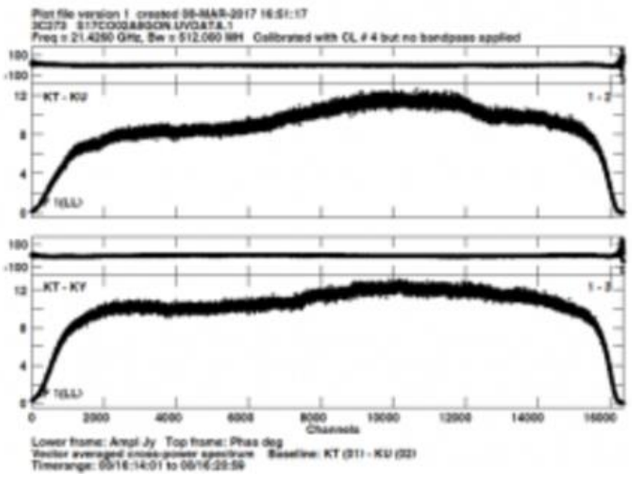


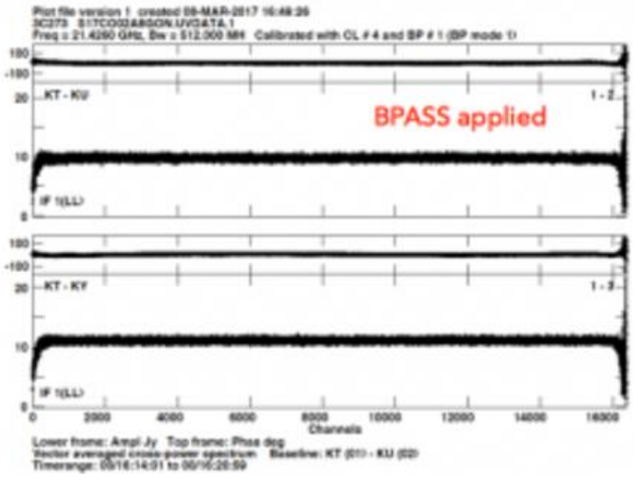
- VLBI papers are increasing
- S/D papers from 86 & 130GHz bands and Polarizations

New Capabilities : 8Gbps Operation

- 4 x 512MHz BW
- 3 times higher SNR
- ~200 h in 2017A
- Open for common use



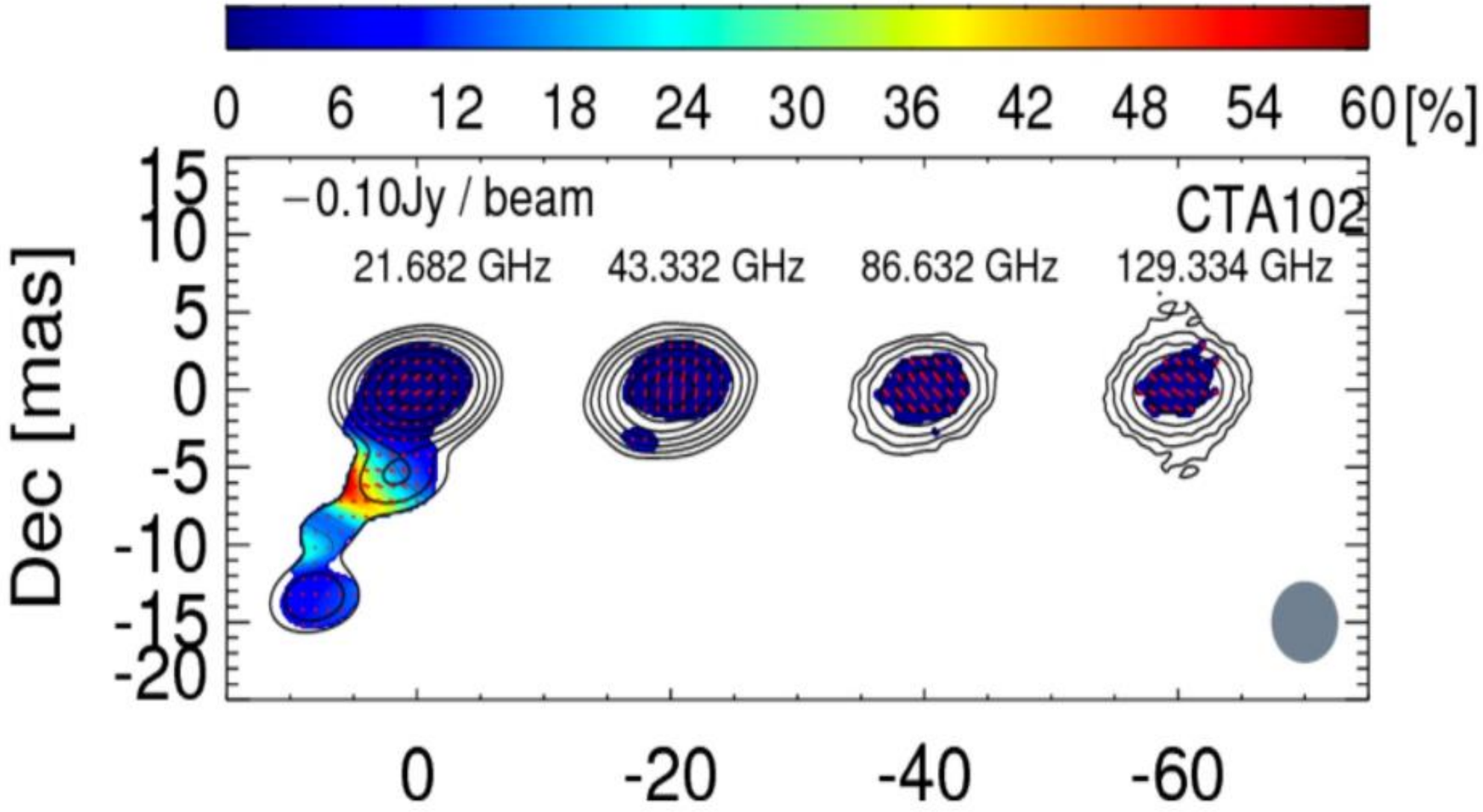




by S.-S. Lee

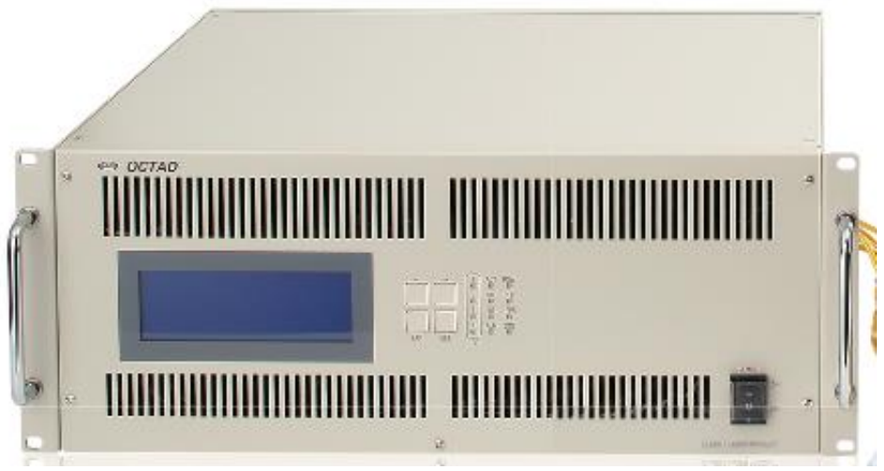
New Capabilities : 130GHz Polarization

- Polarization Calibration up to 130GHz - JH Park



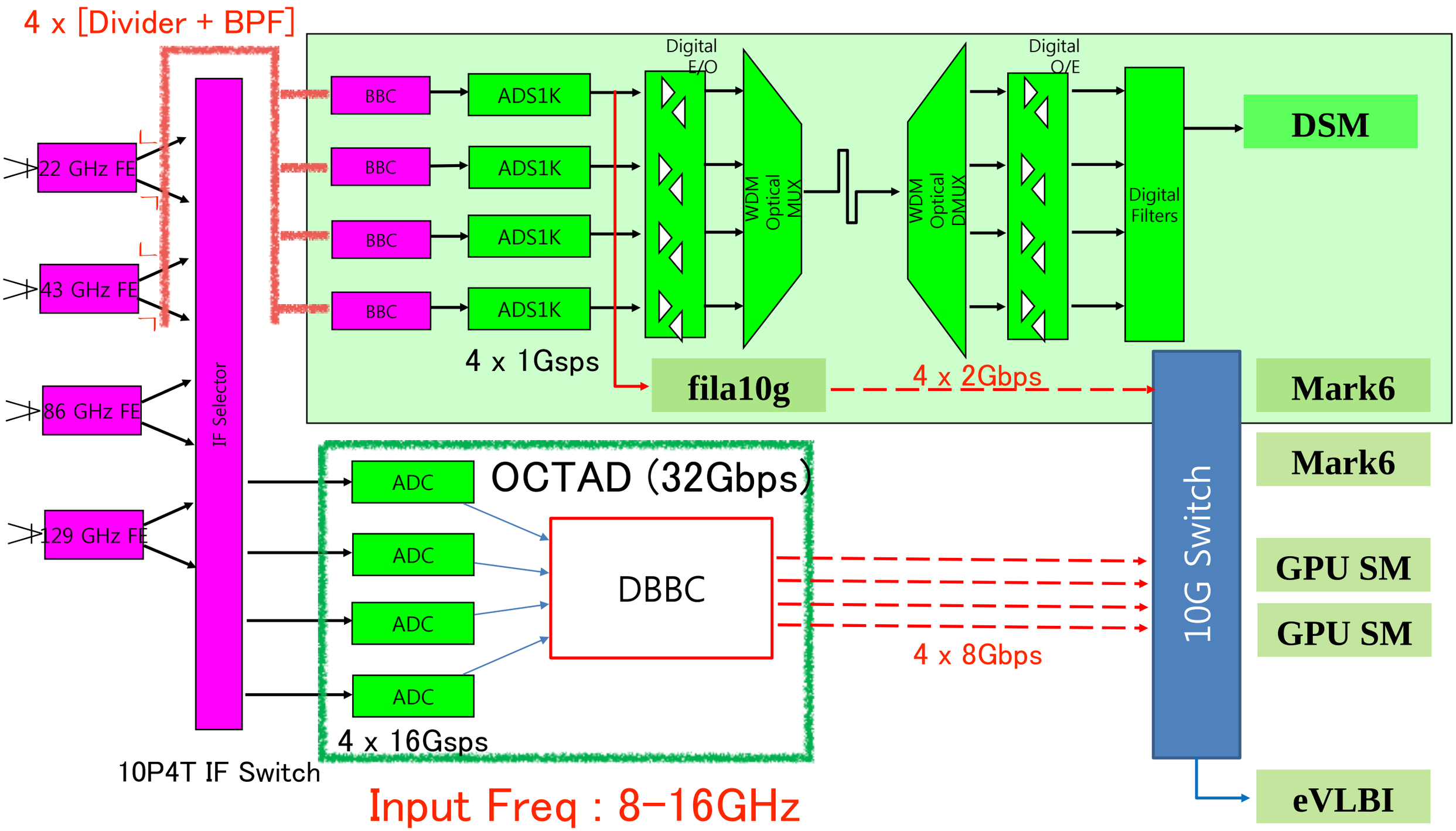
New Wideband Sampler: OCTAD

- 4 ADC (4 x 16Gsps) + DBBC(DFB)
  - 4 IF x 2GHz BW (max 32Gbps)
- Installation : 2017. 8, Test : 17B, 18A
- Field Test at Yonsei
  - 2 IF x 8Gbps (2GHz BW : 8-10 GHz)
- 43 & 86GHz



Elecs co. (Japan)

KVN Wideband Backends (2018 -)



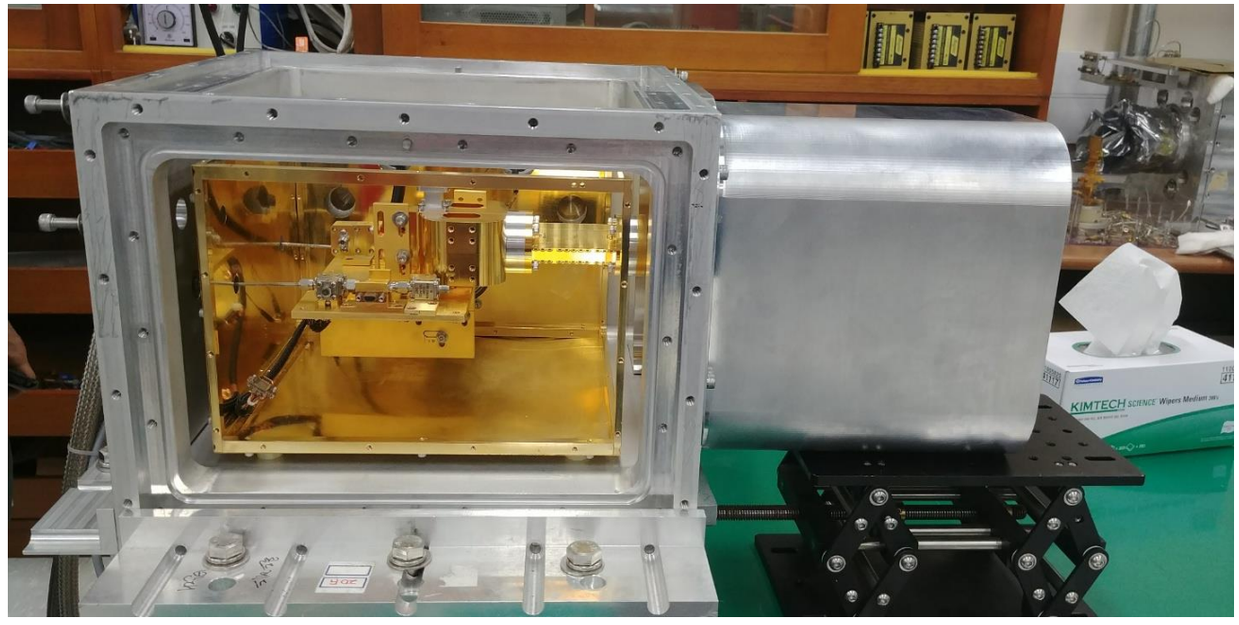
wideband Rx Project

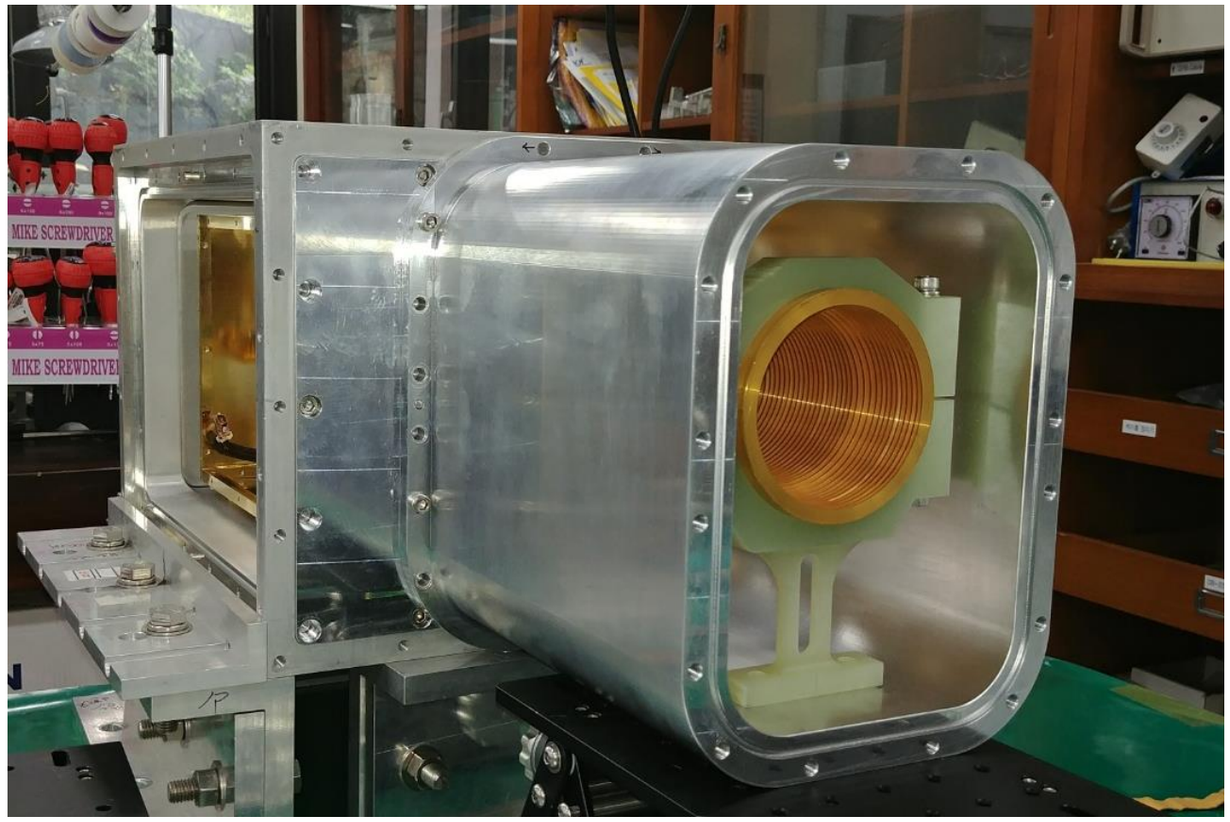
- Term : 2017 – 2019
- Upgrade current Rx by replacing narrow band components
  – LNA, Feed Horn, Polarizer, LO etc

	Freq(GHz)	Trx(K)	Installation
K	16-26	< 40	2017 – 18
Q	35-50	< 50	2018 – 19
W	85-115	< 80	2018 – 19
D	125-172	< 60	2019

Upgraded 22GHz Rx for Yonsei

- Compact Feed Horn
- Wideband Compact Polarizer
- New LNA
- RF 18 - 26.5GHz
- IF 8 - 16GHz
- Tunable 1st LO

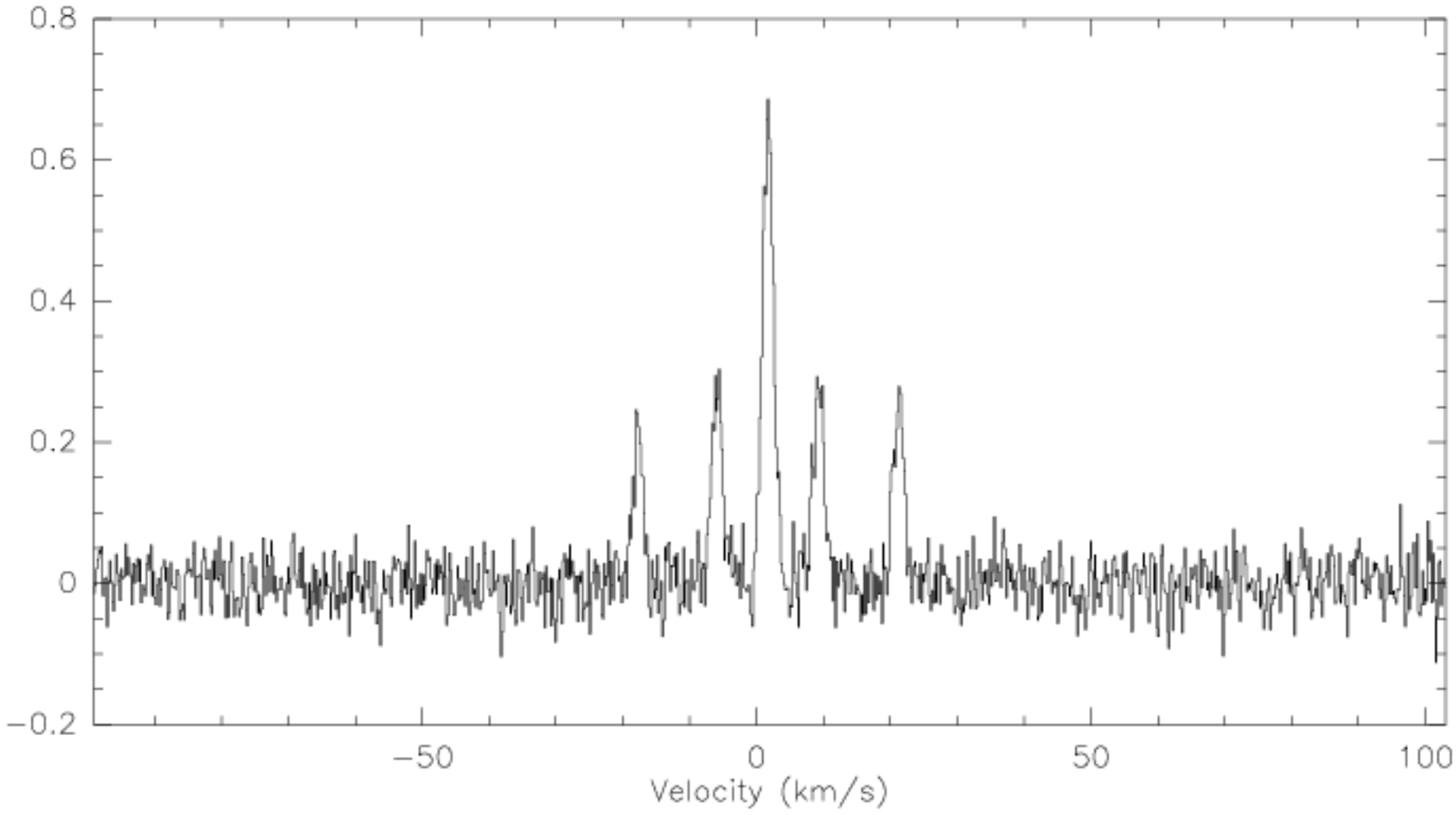




First Light with upgraded 22GHz Rx

88602; 2 HM20188+3928 23694 KYS21M22R O:30−AUG−2017 R:30−AUG−2017
RA: 20:20:39.30 DEC: 39:37:52.0 Eq 2000.0 Offs: +0.0 +0.0
Unknown tau: 0.137 Tsys: 103. Time: 20. min El: 73.2
N: 1023 I0: 512.250 V0: 2.000 Dv: 0.1977 LSR
F0: 23694.5060 Df: −1.5625E−02 Fi: 41953.4940

NH3 Line at 23.7GHz



KVN-Extended : KVN 4th & 5th Sites

KVN 초기 사업계획
(2002 IVS Proceedings)

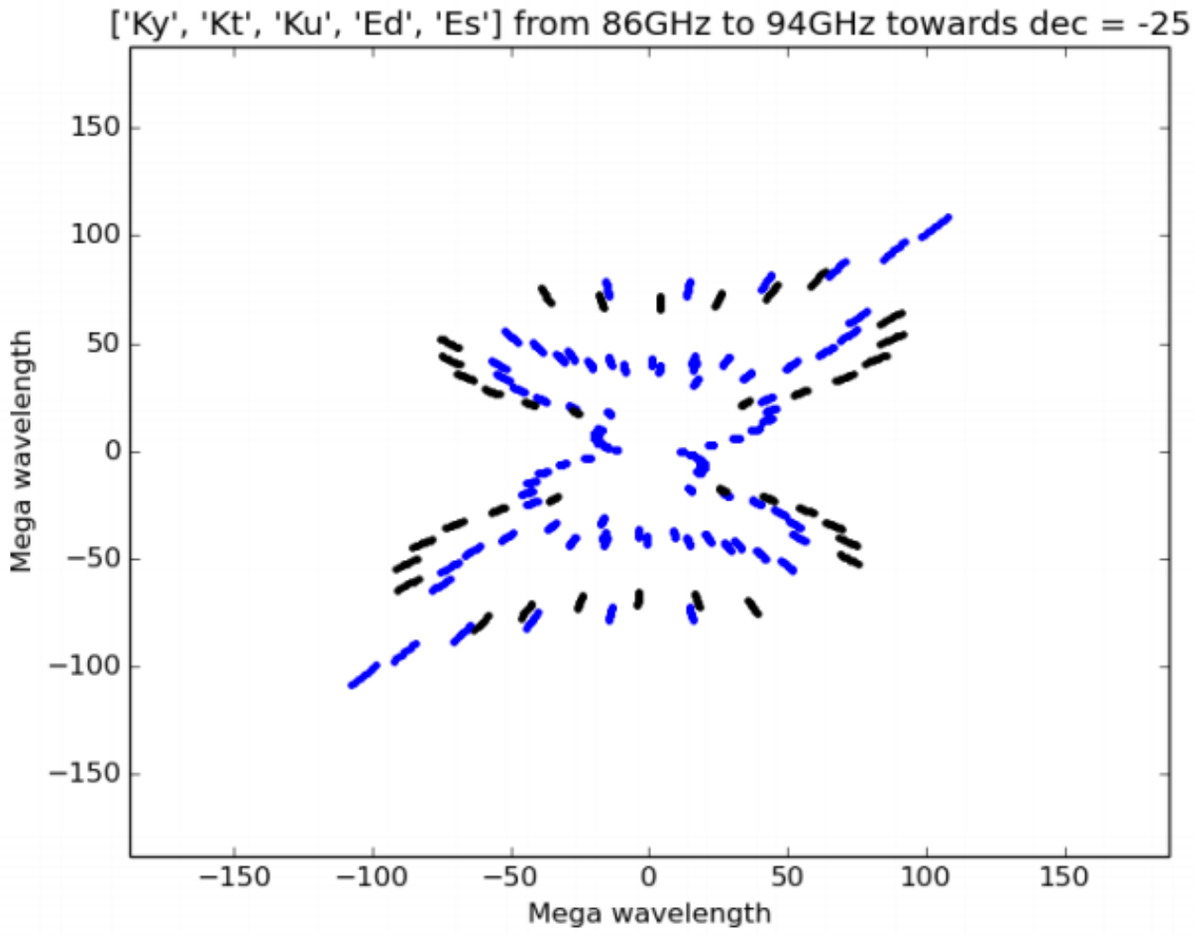
- Why new KVN sites ?
  - More baselines 3 -> 6, 10
  - Amplitude self calibration
  - 3 times better imaging
  - better success rate & sensitivity
- Baselines : 40 - 500 km

  * longer baselines (> 500km) from international collaborations
- Frequency : 18 - 172 GHz
- Construction Period : ~3 yrs
- Budgets : ~15M USD / site

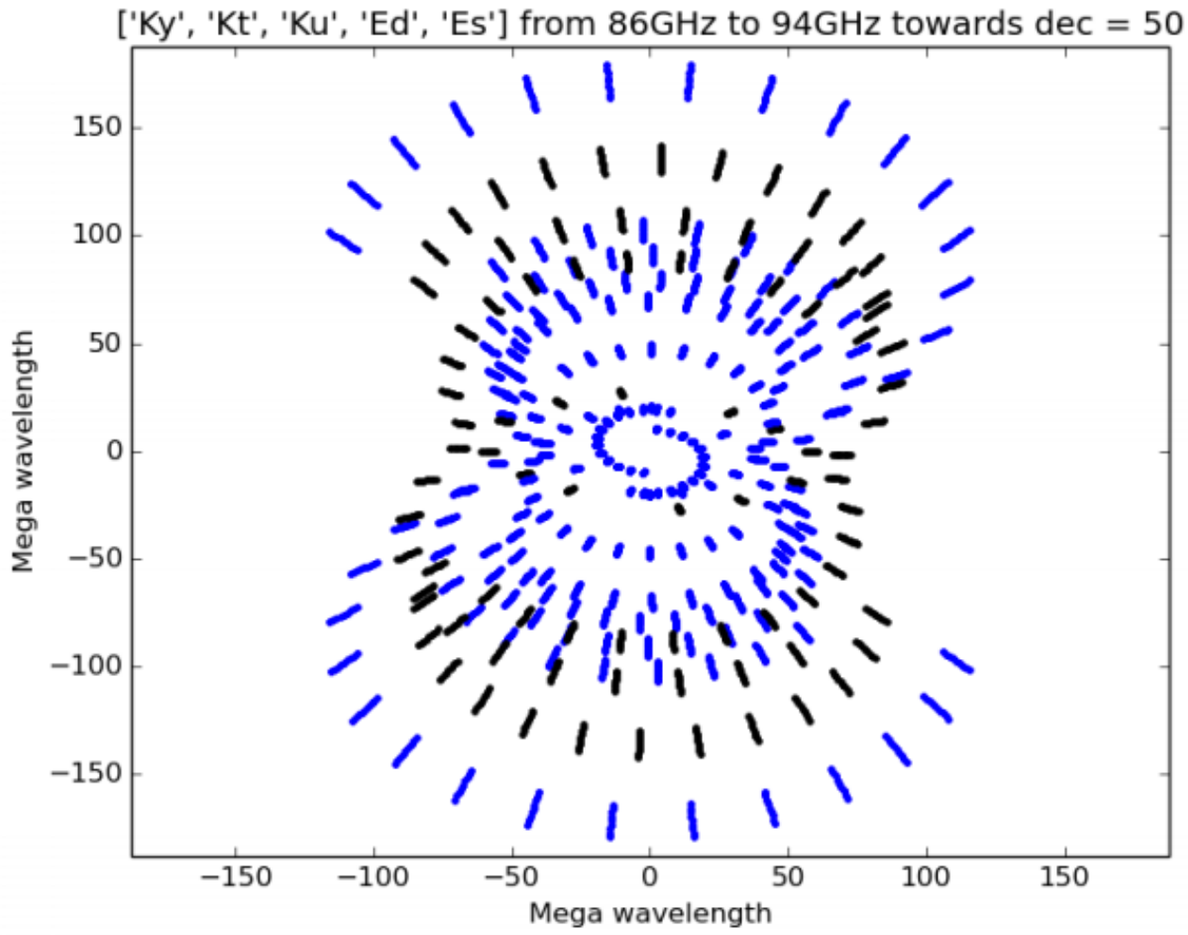
UV Coverage (Example)

- KVN + Daegu, Sokcho at 86 - 94GHz / 1h Step

Dec = -25



Dec = -50



Science Cases

- AGNs
  - AGN Core-Jets, High-z AGN, LLANGs
  - AGN Feedbacks, Absorptions
  - Magnetic Field
- SFR & Evolved Stars
  - Faint & extended maser features
  - Water & SiO, 44/95 Class I Methanol -> Kinematics & Magnetic Field
- Microquasars, Pulsar, SNe, ..
- + S/D Sciences

→Any ideas and/or suggestions are welcome

KVN + Sejong

- 22-m Diameter
- Frequency : 2/8/22/43GHz
- Location: ~20km North from Daejeon
- Baselines between SJ-KVN

	YS	US	TN	SJ
YS	–	305	477	120
US	305	–	358	206
TN	477	305	–	367
SJ	120	206	367	–

- 2017 : Geodesy ~ 100h (2Gbps)
  VLBI ~ 200h (1/2Gbps)
- 2018 : > 300h
  - KaVA Geodesy or KVN+Sejong
- Common use from 2018B?

Summary

- KVN KSP + KaVA Large Program era
  - VLBI Operation ~ 4000 h/yr
  - Publications are increasing
  - International Collaboration ~ EAVN, EVN, GMVA
- Upgrade Activities
  - 8Gbps Mode & 130GHz Polarization are available
  - Wideband Backend & Receivers
- pre-study of KVN-Extended Project
  - Any ideas and/or suggestions are welcome