



# EMMA $\neq$ AAVS2?

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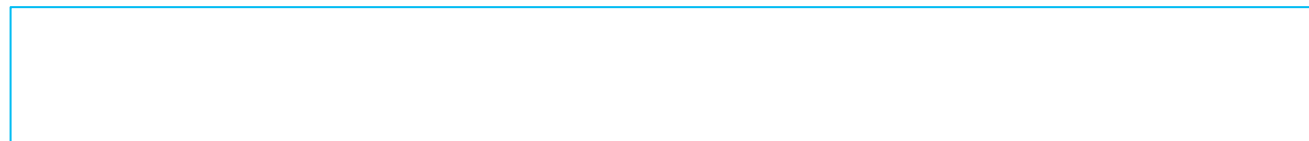


# AAVS-mid outline



AAVS0: EMBRACE

AAVS1: array demonstrator



EMMA: 2000m<sup>2</sup> full SKA station

technology



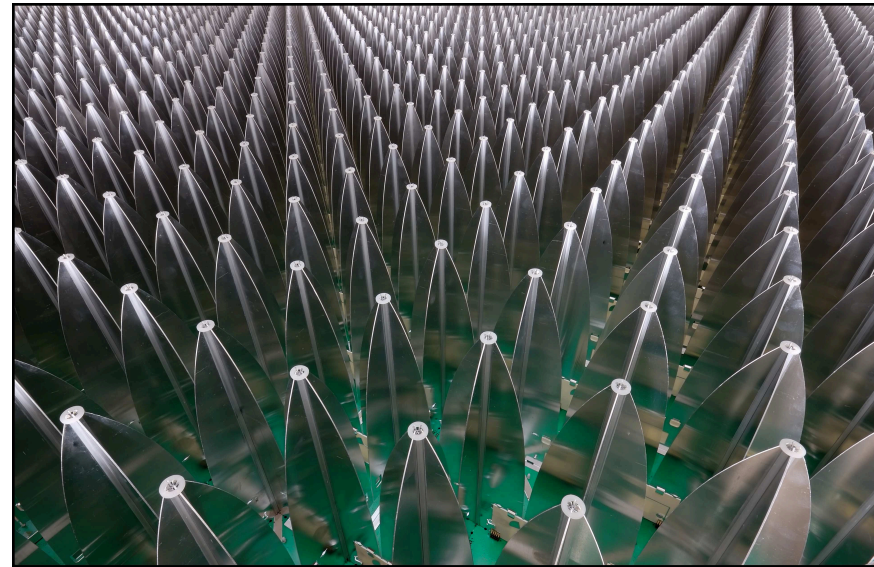
science



# EMBRACE



- Nançay & Westerbork stations (200m<sup>2</sup>)
- Dual analogue beams, >8 digital beams
- 100 square degrees FoV
- 500 (900)-1500 MHz
- T<sub>sys</sub> ~ 100K
- BW 100MHz
- Single polarization



# AAVS-mid schedule



- EMBRACE: operational
- AAVS1: 2013-14  
(awaiting site selection)
- AAVS2: 2015-16  
in parallel to SKA phase 1
- EMMA: >2016  
expanding to 4 stations

# EMMA: one SKA station



- On site, 2000m<sup>2</sup>
- Dual analogue beams, 256 digital beams
- 80 square degrees FoV
- 450-1450 MHz
- $T_{\text{sys}} < 50\text{K}$
- $\text{BW} > 500\text{MHz}$

# EMMA configuration



- 14 sub-stations
- longest baseline  $> 300\text{m}$   
demonstrate dynamic range
- longest baseline  $< 1\text{ km}$ :  
resolution  $> 30\text{ arcmin}$  at  $1450\text{MHz}$

# Comparison



- SSFoM comparable to ASKAP, APERTIF
- FoV champion
- Sensitivity  $\sim 40 \text{ m}^2/\text{K}$
- Largest frequency range

# Some numbers

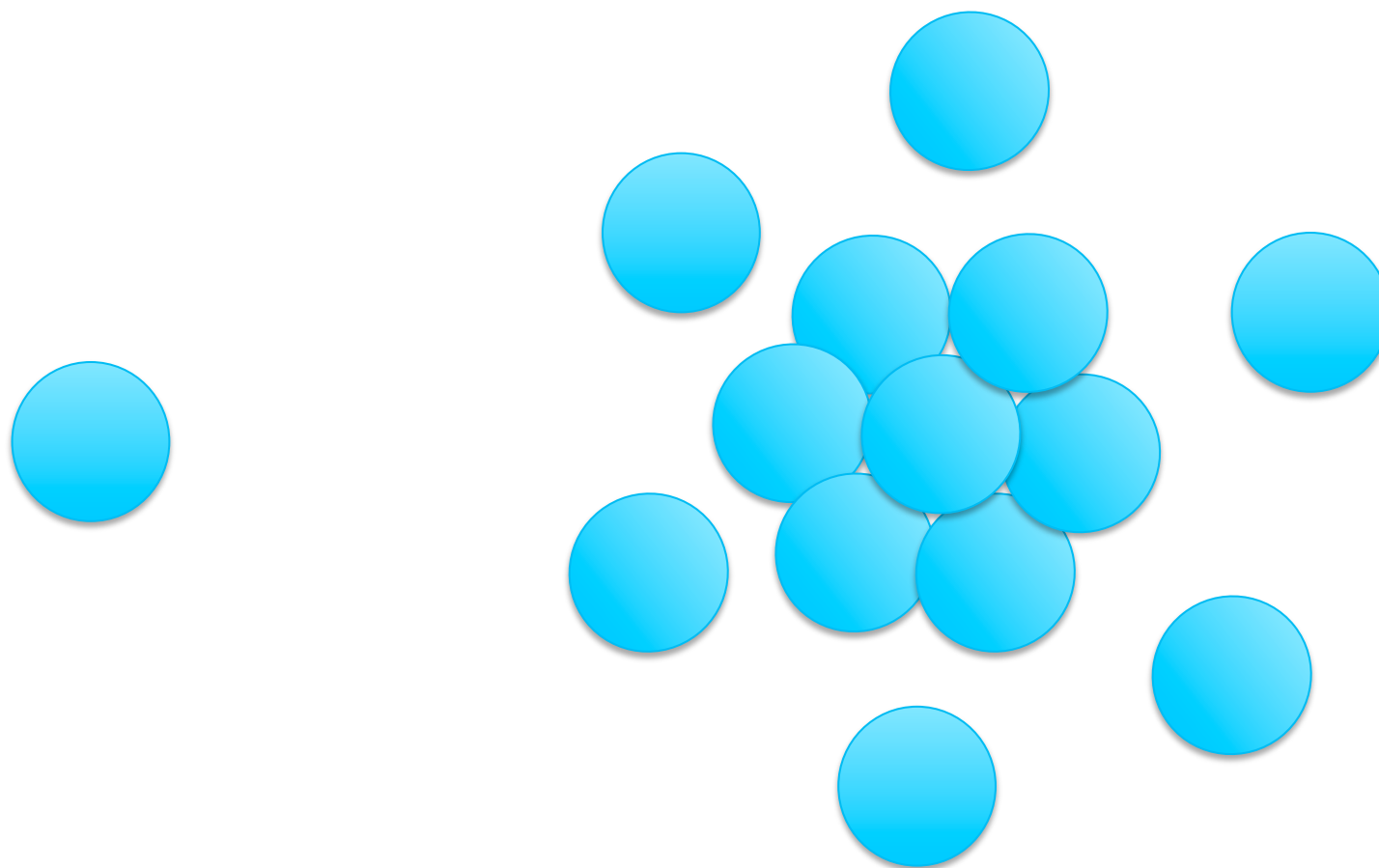


	EMMA	APERTIF	ASKAP	EVLA	MeerKAT-1
Frequency (GHz)	0.450-1.45	1.0-1.7	0.7-1.8	1.0-50	0.9-1.75
Bandwidth (GHz)	0.5 (1.0)	0.3	0.3	0.5 (8.0)	0.35
FoV ( $\text{deg}^2$ , 1.4GHz)	78	8	30	0.3	0.6
$z_{\text{max}}$ for HI absorption	2.16	0.42	1.03	0.42	0.58
$S_{\text{rms}}$ ( $\mu\text{Jy}$ , 1h, full BW)	37 (27)	30	35	7.6	14.6
$S_{\text{rms}}$ ( $\mu\text{Jy}$ , 1h, 100MHz)	84	49	61	17	27
$S_{\text{rms}}$ (mJy, 1h, 5 km/s)	5.5	3.7	4.0	1.1	1.8
A/T ( $\text{m}^2/\text{K}$ )	40	105	58	246	150
SSFOM $\times 10^4$ ( $\text{m}^4/\text{K}^2/\text{deg}^2$ )	12.5	8.9	13.8	1.8	1.4
SSL( $\tau < \tau_0$ )/ $N_t$	1	0.92	0.73	5.3	5.6

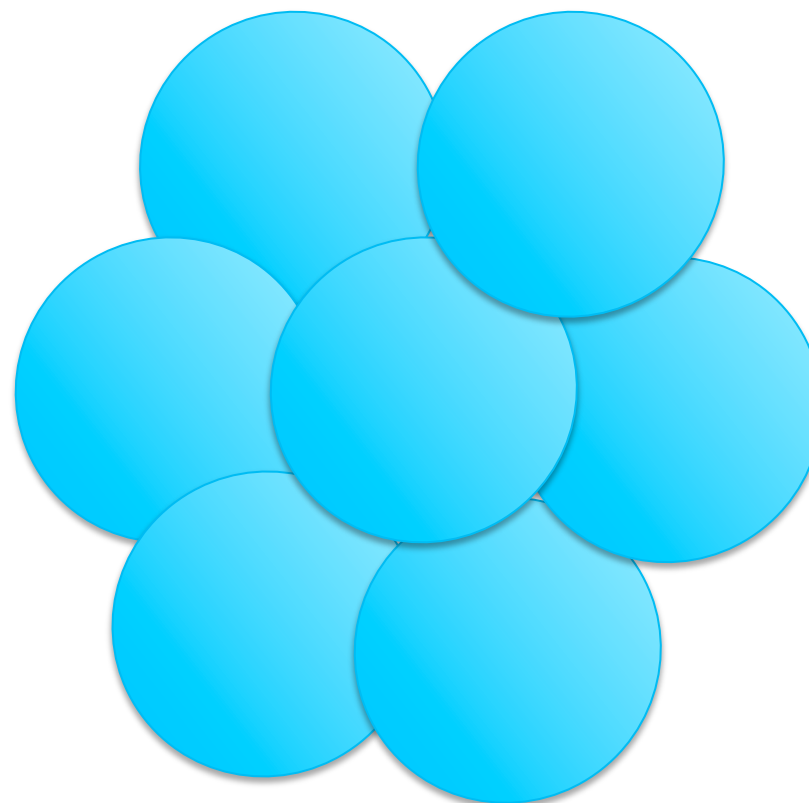
These numbers are subject to change!



# A visual concept



# Alternative



# Science goals



- BAO
- HI emission and absorption
- Pulsar observations
- Polarization studies
- Transients detection and follow-up

# Demonstration goals



- Imaging quality
  - Beam stability
  - Calibration
- Dynamic range
- FoV, bandwidth & post-processing
- Polarization characteristics
- Multi-beaming concept
- Reconfiguration time

# Flexibility



- Easy to build, expand and maintain
  - per station
  - per sub-station
  - tile level
- Do multiple observations at once
- Re-configuration
  - sub-arraying
  - quick re-pointing

# Considerations



- Fit snugly into SKA design path
- Post-processing power >> APERTIF
- Data rate: tens Tb per day?
- Funding: 10-20 M€

# Conclusion



EMMA:

is a potential pathfinder  
design is still flexible  
could be SKA2 station

AAVS2:

is a demonstrator  
should fit snugly into SKA design  
< SKA2 station

