Square Kilometre Array Update

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SKA Phase 1 (SKA1)
Cost €650M, construction start 2018

Southern Africa
SKA1_MID
254 Dishes including:
64 x MeerKAT dishes
190 x SKA dishes

Australia
SKA1_LOW
Low Frequency Aperture Array Stations
96 Dishes including:
36 x ASKAP
60 x SKA dishes

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How does SKA1 baseline redefine state-of-art?

<table>
<thead>
<tr>
<th></th>
<th>JVLA</th>
<th>MeerKAT</th>
<th>SKA1-mid</th>
<th>ASKAP</th>
<th>SKA1-survey</th>
<th>LOFAR</th>
<th>SKA1-low</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_{\text{eff}}/T_{\text{sys}}$</td>
<td>m$^2$/K</td>
<td>265</td>
<td>321</td>
<td>1630</td>
<td>65</td>
<td>391</td>
<td>61</td>
</tr>
<tr>
<td>FoV</td>
<td>deg$^2$</td>
<td>0.25</td>
<td>0.86</td>
<td>0.49</td>
<td>30</td>
<td>18</td>
<td>14</td>
</tr>
<tr>
<td>Survey Speed FoM</td>
<td>deg$^2$m$^4$/K$^{-2}$</td>
<td>$1.76\times10^4$</td>
<td>$8.86\times10^4$</td>
<td>$1.30\times10^6$</td>
<td>$1.27\times10^5$</td>
<td>$2.75\times10^6$</td>
<td>$5.21\times10^4$</td>
</tr>
<tr>
<td>Resolution</td>
<td>arcsec</td>
<td>1.4 - 44</td>
<td>11</td>
<td>0.22</td>
<td>7</td>
<td>0.9</td>
<td>5</td>
</tr>
</tbody>
</table>

$A_{\text{eff}}/T_{\text{sys}}$: 6.2x 6.0x 16x
Survey Speed: 74x 22x 520x

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SKA1 “2nd generation” configurations

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SKA1 performance as function of scale

Monochromatic Imaging Performance

Continuum (R=3) Imaging Performance

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SEFD of full array @ 50, 110, 160, 220 MHz: 19, 2.9, 2.6, 2.6 Jy

45m Station FoV @ 50, 110, 160, 220 MHz: 78, 16, 7.6, 4.0 deg²

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SEFD of 190 SKA Dishes: 3.5, 2.1, 2.1 Jy
SEFD of 64 MeerKAT Dishes: 13, 8.6, 0 Jy
Total SEFD of 190xSKA plus 64xMeerKAT: 3.5/2.8, 1.7, 2.1 Jy

FoV @ Band Centre: 3.5, 1.0 0.18 deg$^2$

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SEFD of 60 SKA Dishes: 16, 9.8, 13 Jy
SEFD of 36 ASKAP Dishes: 0, 25, 0 Jy

Total SEFD of 60xSKA plus 36xASKAP: 16, 6.7, 13 Jy

PAF FoV: 126, 36, 6.5 deg$^2$
(designed for 36 beams @ band centre)
Log($M_\odot$) = 8.5, 9.5, 10.5

= Dwarf, $M^*_{HI}$ ultra-gas-rich
Timeline

Request for Proposals
Proposal responses
Proposal evaluation
Cost ceiling established
Design consortia start
Preliminary Design Review
Prototype systems deployed
Critical Design Review
Seek SKA1 funding
Develop SKAO governance
SKA1 construction approved
Tender & procure construction
SKA1 construction
Detailed design of SKA2
SKA1 early science

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Thank you

www.skatelescope.org