Stars, the Sun and transient sources

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- Science Issues
  1. Stellar detectability
  2. Astrometry
  3. Low brightness imaging
  4. Masers
  5. Transient sources
     - X-ray binaries, supernovae, Gamma ray sources, GRB, IDV, ESE, microlensing, gravity wave emitters, exoplanets, SETI, unknown…
  6. Pulsar
  7. Solar corona and the solar wind

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Phase II requirements by science area

NMA	2,3,4,5,7
E-Configuration	
Low-Frequencies	
Interaction with VLBA	2,4,5,7

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- ***What are the key science drivers for the NMA?***

1. High-resolution, low-brightness imaging (NMA)
    - Milliarcsecond thermal imaging
    - Low-brightness active non-thermal binary systems

2. Astrometry (NMA and VLBA link)
    - Relative positions, stellar motions, pulsar parallax

3. Imaging of transient phenomena (NMA and VLBA link)
    - Dynamic imaging of X-ray binaries
    - High resolution, rapid follow up of transient phenomena

4. Interplanetary Scattering (NMA and VLBA link)
    - fill in spatial frequency gap in scattering power spectrum

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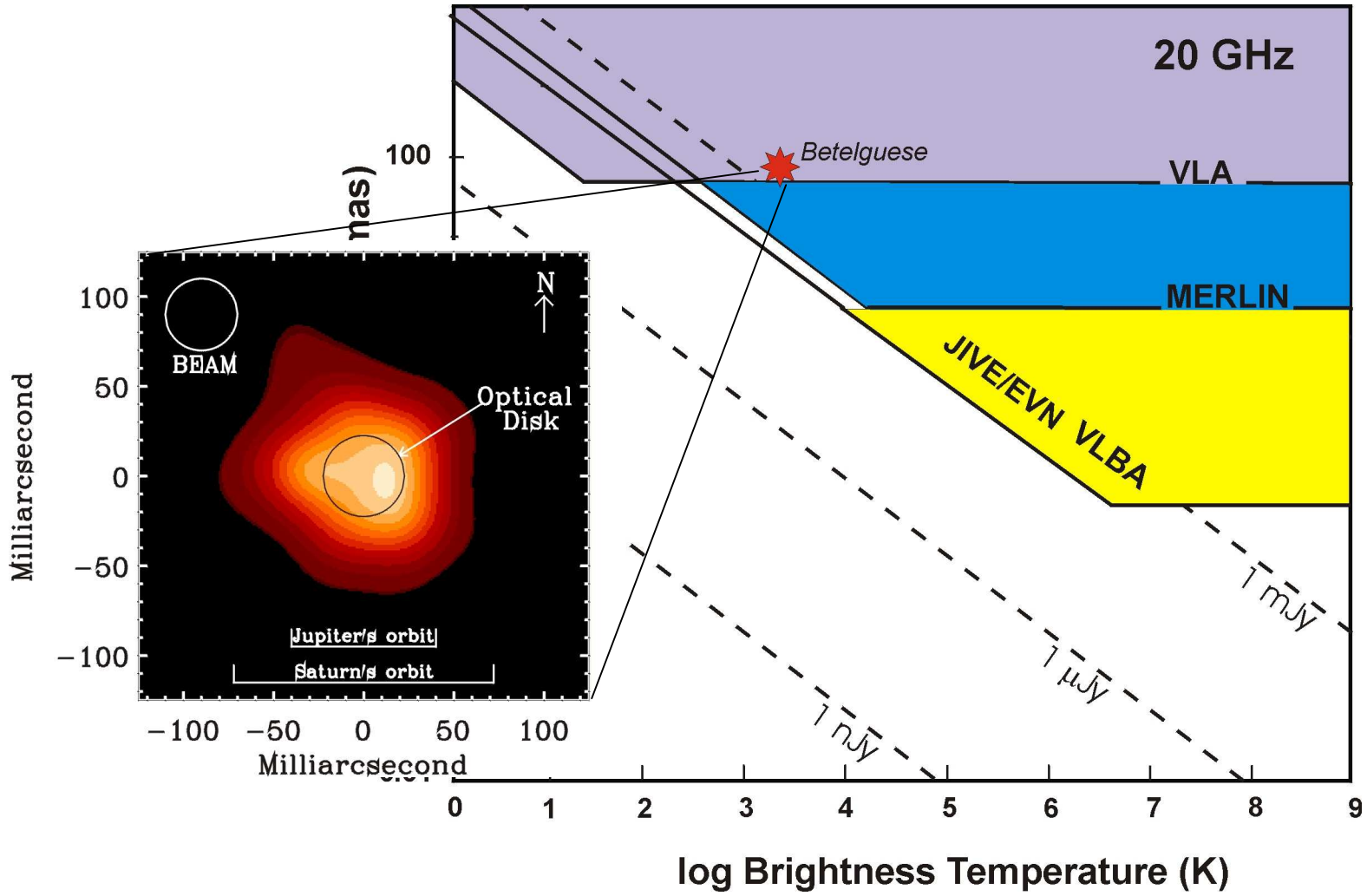

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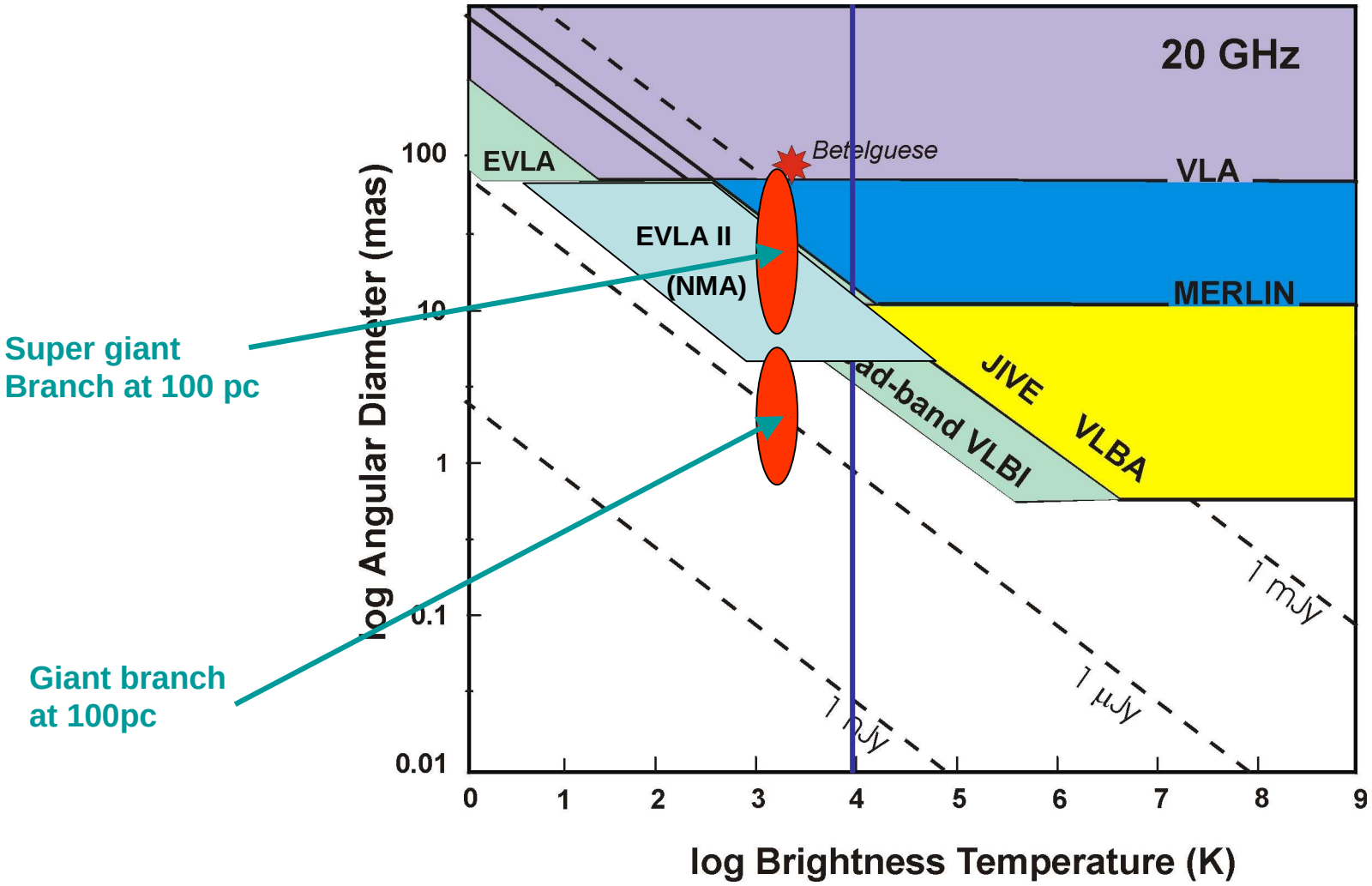

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- ***Should we build the NMA?***

  Yes

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- ***Within the scope of this project, is the baseline plan of 8 new antennas plus PT/LA about right?***
  - More is better, but note that one station ~ $6 M
  - Simulations are required to assess efficacy of multi-frequency synthesis (MFS) and minimum number of antennas required
  - NMA science is almost entirely continuum, therefore MFS may be standard operating procedure

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- ***What is the required maximum frequency?***
  - ~40 GHz for continuum thermal imaging and astrometry at highest resolution.
  - 43 GHz for SiO masers

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- ***Would you be willing to trade frequency coverage for collecting area?***
  - Reduce high frequency limit from 40 GHz to 22 GHz for a factor of ~10 increase in collecting area (improved brightness sensitivity).
  - Large increase over e-MERLIN

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- ***How important is stand-alone NMA operation?***
  - Enhances the ability to follow-up of transient targets of opportunity and coordinate multi-wavelength campaigns (independent of the VLA configuration).
  - Provide TOO Imaging of novae, x-ray binaries,…
  - (Ability/software for quick response to TOO should be factored into the scheduling and operation.)

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- ***What field-of-view is required for the NMA?***
  - No strong driver for very large FOV. Current VLA/VLBA FOV sufficient.

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- ***Rank the relative importance of:***
  1. ***Getting NMA done quickly with conventional technology.***
  2. ***Developing new technologies to increase capabilities of EVLA II.***
  3. ***Developing SKA technology independent of EVLA II.***

  1.7

  – A plan for EVLA II with conventional technology is a good benchmark. But NRAO should facilitate new technology studies in cooperation with US SKA consortium, with the common goal to adapt new technologies for EVLA II around 2005/6 when NMA stations would be constructed.
  – A delay of order 1 year is acceptable for new technology enhancement.

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- ***How far should we go in integrating the VLBA with VLA as part of EVLA-II?***
  - As a minimum NMA should be operational with the VLBA (signals recorded at AOC).
  - All science goals are enhanced if the VLBA is fully integrated into the NMA as a real-time array.

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- ***What are key science drivers for the E configuration?***
  - None were identified in this working group
- ***What are key science drivers for low frequencies on the EVLA?***
  - None were identified in this working group
  - Some concern of impact of LF modifications on high frequency capability

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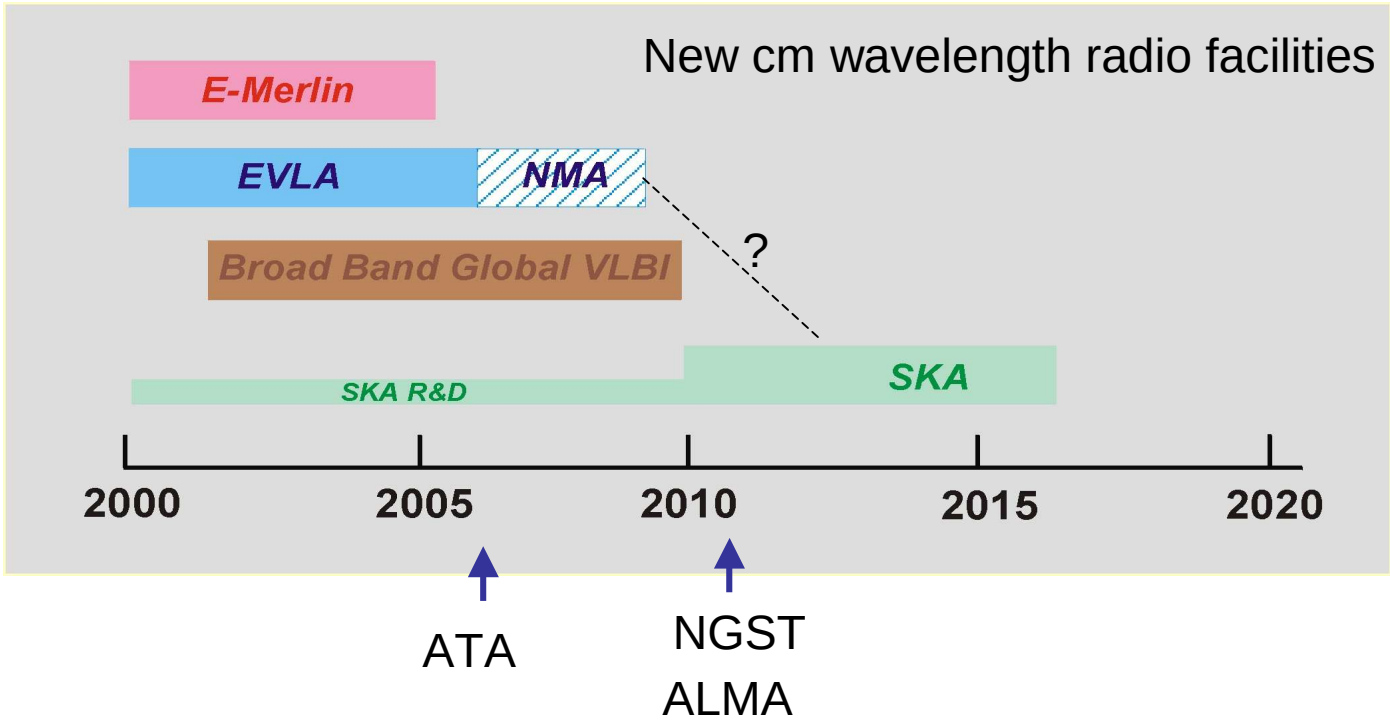
- ***What should be the plan for radio astronomy in the next several decades, and how does the EVLA fit into that plan?***



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- ***What should be the plan for radio astronomy in the next several decades, and how does the EVLA fit into that plan?***
  - NRAO should be involved in technology development and should not divorce itself from the SKA R&D during EVLA II.
  - SKA technology developments may enhance the EVLA II capabilities. The EVLA II could serve as a step to the SKA.
  - NRAO should cooperate and support SKA Consortium technology development initiative with common goal for a sufficient progress for a decision around 2005/6 for potential new technology NMA stations.

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- ***How should the EVLA relate to LOFAR?***
  - For transient source follow-up it would be beneficial if:
    - EVLA and LOFAR have common sky visibility
    - EVLA and LOFAR have common operations or real-time access data