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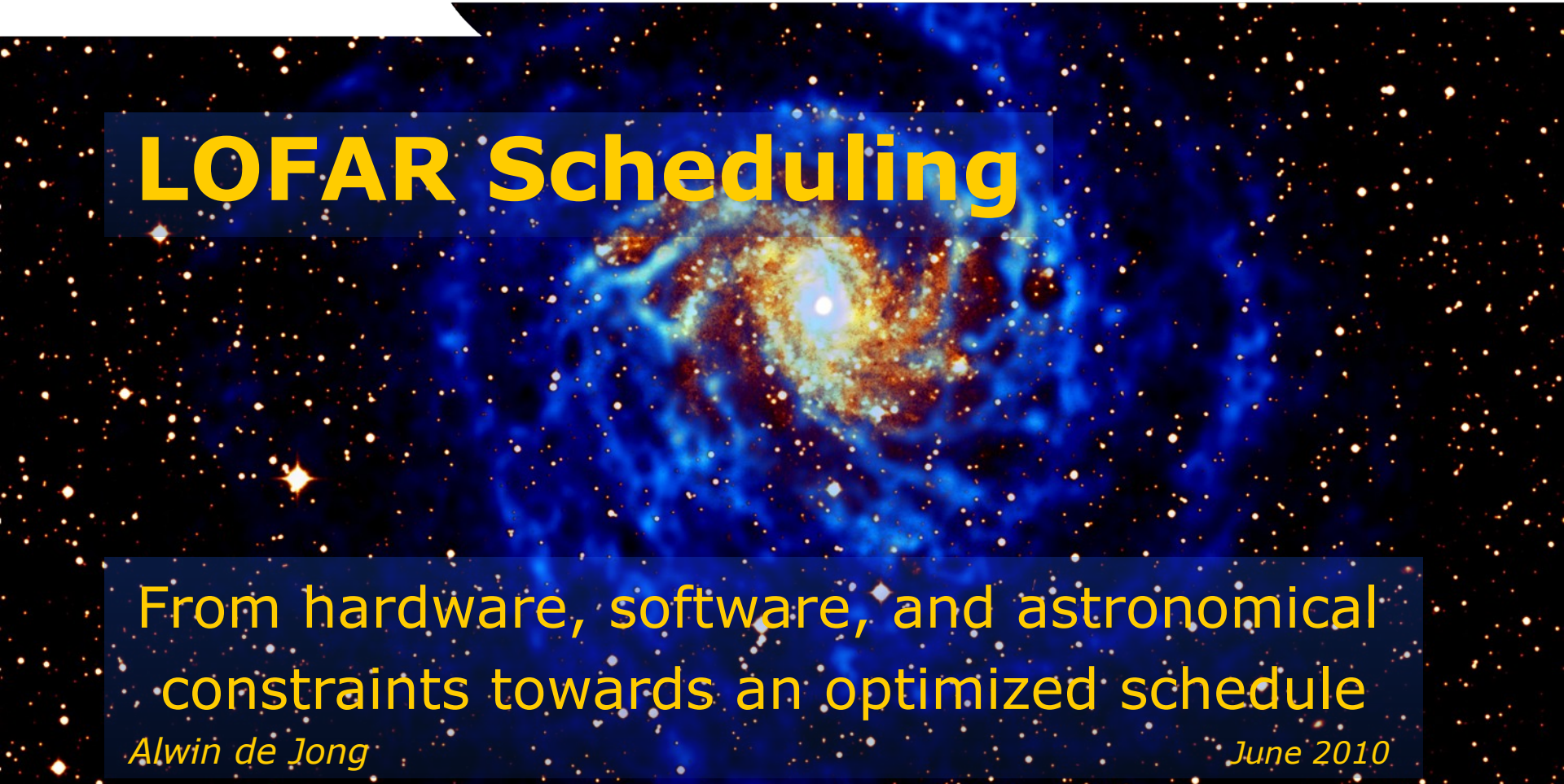

LOFAR Scheduling

From hardware, software, and astronomical constraints towards an optimized schedule

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Goals of LOFAR scheduling

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Scientific and Astronomical goals

- To use the LOFAR telescope to its fullest potential, both in capabilities as well as maximizing scientific observing time
- To be able to generate schedules that maximize scientific value (prioritization)
- Maximize observational flexibility
- To maintain reliable operation
- To be able to conduct parallel observations

Goals of LOFAR scheduling

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Translating to scheduling system goals:

- Maximize use of the LOFAR resources
- Maximize useful observing time
- Automatic constraints and conflicts resolving
- Create flexible and fast scheduling with possibility of short term override
- Minimize CEP overload probability
- Present different scheduling solutions and sufficient feedback for user to make scheduling decisions (scheduler uses specialised simulated annealing algorithm)

Resources that need scheduling

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- Stations (antenna fields, data slots)
- Blue-gene P-Sets (compute cores and I/O nodes)
- Storage nodes (capacity)
- Offline cluster resources (CPU, storage) are timely coupled to online processes

Some scheduling constraints...

- Station constraints which cannot be different amongst parallel observations:
  - Different grades of parallelization
  - Clock modes i.e. 160MHz / 200MHz
  - Antenna pass-band filter types
  - RSP Data slots can only be assigned to single subband & beam
- Parallel observing CEntral Processing constraints
  - P-Set partitioning scheme (assigning compute-cores to observation)
  - Storage nodes read/write interleaving (especially important for MS^3)
  - Storage nodes available capacity during schedule lifetime
  - Bit mode (16, 8, 4 bits) constraint
- Observational constraints
  - Source visibility
  - Allowed time window (ΔLST) for observation

Additional (future) scheduling constraints

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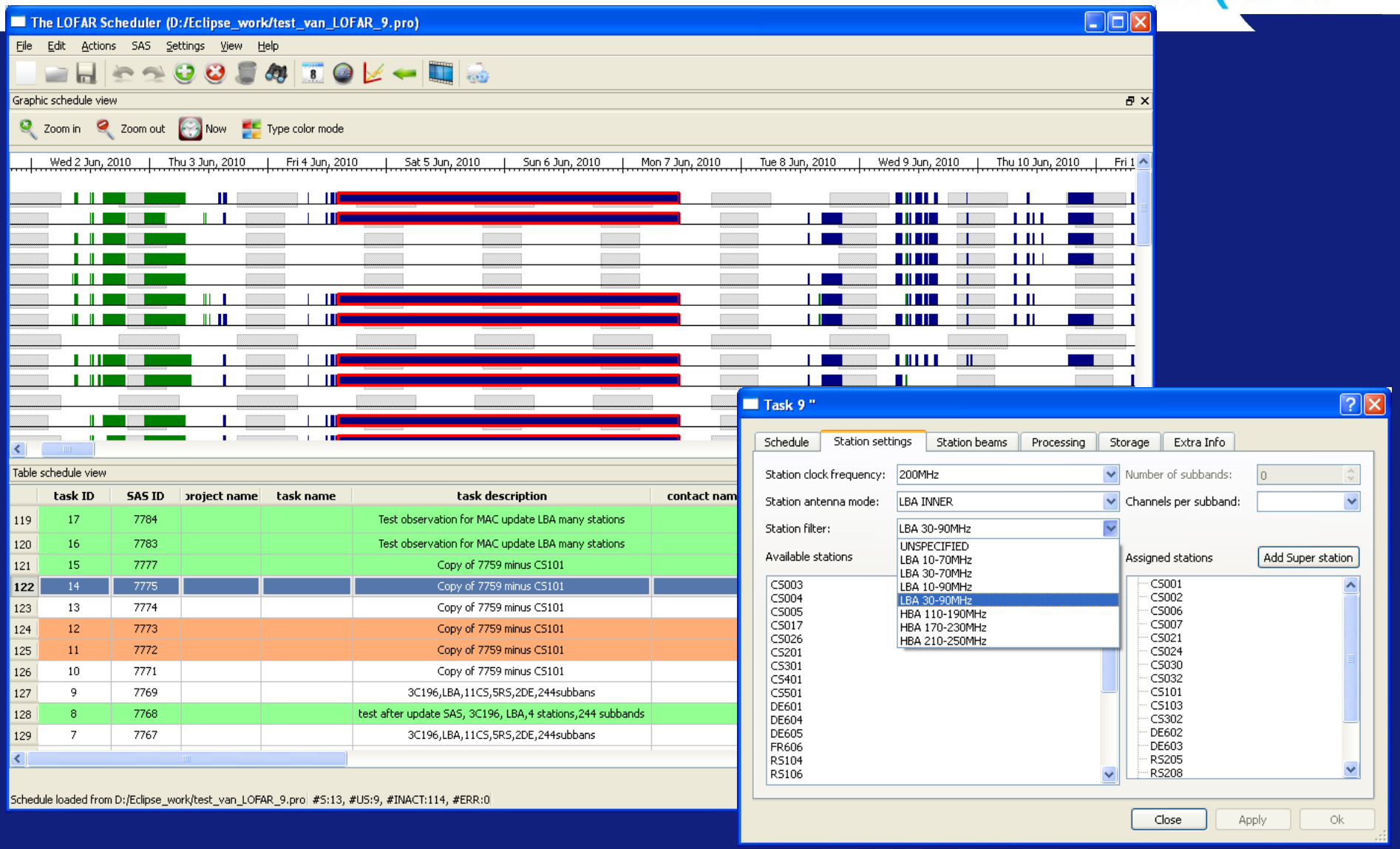
- observations with different bit mode (16, 8 and 4 bits) cannot run in parallel on the same station because of CEP correlator and RSP data-slot assignment
- Might be possible to run parallel observations on different stations in different bit-mode

Hands-on demo



LOFAR Scheduling from hardware, software, and astronomical constraints towards an optimized schedule

What's next on LOFAR scheduling?

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- Move to parallel observations:
  - storage nodes raid sets need 'parallel' specification
  - RSP dataslot assignment needs to be differentiated on station level
- Storage capacity prediction and planning
- Offline pipelines scheduling of post-processing coupled to online pipeline observations
- Resource claim system for reservations needs further implementation
- MS^3 scheduling system (many sub-observations)
- Automatic 'leveling' of resources to prevent possible overloads (CPU and storage leveling)
- 'New' observation modes might require different type of scheduling (different or additional constraints)

LOFAR Scheduling workshop

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- Within couple of weeks a scheduling workshop will be organized (1 or 2 days)
- Intended audience: Observers, Science Support and Astronomers
- Interested to join the LOFAR scheduling workshop? Please send me an e-mail: jong@astron.nl