Strategies for Running and Enhancements

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18 May 2005

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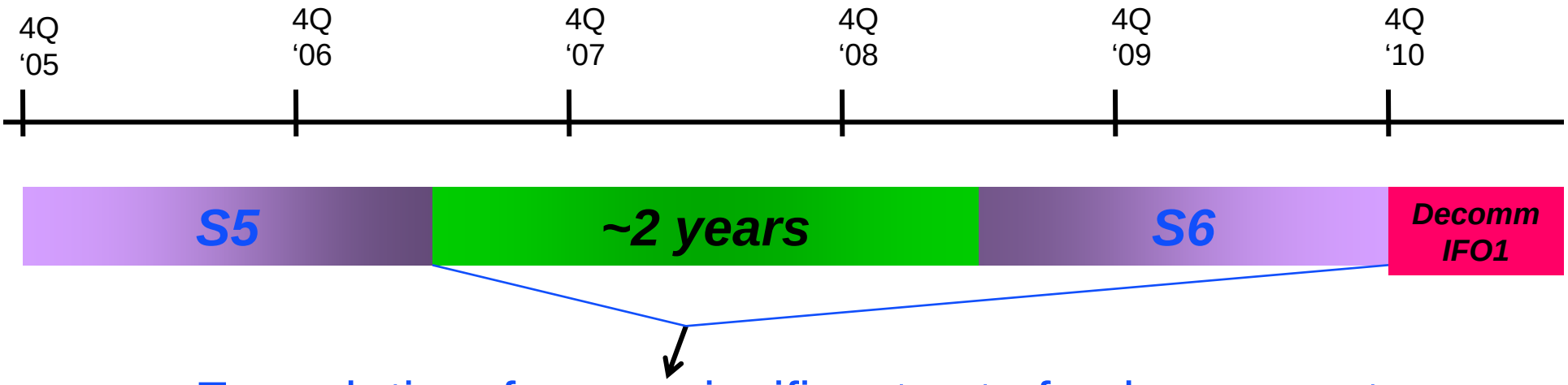
Current Situation

- Interferometer sensitivity approaching fundamental limits—further progress gets harder and harder
- Advanced LIGO approved as MREFC project by National Science Board (Oct ’04)
  - » “…Advanced LIGO is sufficiently advanced and the intellectual value of the project sufficiently well demonstrated to justify consideration by the Acting Director and the National Science Board for funding in FY 2007 or a future NSF budget request…”
  - » “…the existing LIGO Program will collect at least a year’s data of coincident operation at the science goal sensitivity before initiating facility upgrades…”
- NSF budget (Feb ’05) indicates FY08 start, shutdown of first interferometer early 2011

Next Science Run (S5)

- S5 goal is to meet NSB condition for AdvLIGO funding
  - » "at least a year's data of coincident operation at the science goal sensitivity "
- Tentative plan
  - » S5 to start late 2005
  - » Run Committee to guide exact timing and preparations
- Performance goals for S5
  - » Develop sensitivity goals and duty cycle goal
  - » Optimize plan
    - – Review with PAC, NSF Review Panel
- Continued running to start of Advanced LIGO adds only incrementally to Science Content

The Next 5-6 Years



- Enough time for one significant set of enhancements
- Possibly time for 2 upgrade steps, with a short run in-between
- Plan should consider contingency options for potential AdLIGO delays
- Plan should phase to minimize down-time

Case for Enhancements to Initial LIGO

- Delays in Advanced LIGO have opened a window for modest enhancements to initial LIGO
  - » Modest improvements in sensitivity could be very useful-- factor of 2 would increase rate by factor of ~8
  - » Five months of observation to “recover” 3½ years lost observation time at S5 sensitivity
- Possibility to develop, test components and techniques for Advanced LIGO
  - » Leverage Advanced LIGO development budget
- Maintain commissioning momentum and expertise
  - » Train next generation commissioning leaders

Resource Constraints for Enhancements

- Equipment funds
  - » Budget has tightened up
  - » $1-1.5M, over a couple of years, available for enhancements
- Schedule
  - » Realistic installation/commissioning schedule must allow sufficient running time to exploit enhancements
  - » Enhancements should not delay Advanced LIGO implementation
  - » Must remain flexible to new developments
    - – Shifts in AdvLIGO schedule
    - – Detection with initial LIGO
    - – Other unforeseen developments
- Manpower
  - » Will compete with AdLIGO development program for key personnel

Advanced LIGO—Third Interferometer

- Advanced LIGO approved by NSB for FY2007 start, but current NSF budget shows FY2008 start
- One unresolved technical issue is the configuration for the third interferometer
  - » Proposal baseline was convert to 4km length, make “identical” to other two interferometers
  - » Near the lowest cost option
- If we want to reconsider, would be good to decide before cost and schedule are baselined