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Interferometer Sensing & Control

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Current status

- Quantum noise analysis of heterodyne (RF) and homodyne (DC) readout it ongoing
  - » A Buonanno, Y Chen, N Mavalvala
  - » Plan to issue a report this fall
- Development of a low noise Digital-to-Analog converter
  - » Originally an Advanced LIGO R&D item
  - » Bumped up for use in Initial LIGO
  - » Prototype delivery around end November
- Analysis of RF & DC readout sensitivity to technical noise
  - » Done by G Mueller as part of Input Optics requirements analysis
  - » Results will be used to select readout scheme

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Plans for 2003

- Decision on readout scheme (RF vs DC)
- If DC readout, begin design of output mode cleaner and photodetection
  - » Table-top setup: monolithic mode cleaner + controls + output photodetector
- Would like to get lock acquisition modeling going
- Design requirements review
  - » Presently scheduled for mid-2003

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Technical Risks and Opportunities

- Sensing
  - » DC: new, at least for GW interferometers
  - » RF: technical noise coupling looks difficult to handle
- The ISC design will rely heavily on the control band isolation provided by the active seismic system
- Lock acquisition
  - » How much force will be needed on the end test masses?
  - » Photon drive or electro-static?
- Possible additional opportunities
  - » Variable transmission signal recycling mirror

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Schedule issues

- Lock acquisition modeling
  - » Nobody is working on it
  - » Need the results to determine end test mass actuation reqs
- Need to ramp up interaction between ISC and 40m plans

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Cost baseline and issues

- $50k put in MIT budget for ISC equipment
  - » DC readout hardware prototyping

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Staffing baseline and issues

- Very little time being spent on Advanced LIGO ISC now
- MIT budget contains:
  - » 4 months of Peter F
  - » 4 months of Mike Z
  - » 6 months of Rich M (but is expected to be full time on pre-isolator)
  - » 12 months of K Goda (but is slated for other things – squeezed light experiment)
  - » 12 months of T Corbitt (also slated for other things)