

**NSF Presentation -
Subcontract for
Lasers and Laser Support**

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LIGO Lasers: Background

- **Decision made beginning 1996 to switch to Nd:YAG lasers**
- **LIGO requirements developed**
- **Interaction with industry determined:**
 - ›› No commercial laser met all requirements
 - ›› But all required technology did exist
- **RFP for development and initial production released to 6 companies**
 - ›› Significant interest by most companies
 - ›› Only one proposal
 - ›› Other companies did not see enough commercial potential to justify commitment of skilled staff
- **Contract awarded to Lightwave**
 - ›› Approved by NSF

LIGO Lasers: Current Contract

- **Development / design phase**

- ››Based on existing oscillator (Model 126) and high power oscillator converted to amplifier configuration
- ››Breadboard unit to verify design
- ››Formal reviews to give LIGO opportunity to approve design

- **Production of first three units**

- ››Fixed price \$125,000 each
- ››Price valid only if design “essentially” same as proposed

- **Option for up to 5 additional lasers**

- ››Fixed price of \$100,000 each

- **Experience**

- ››High power oscillator did not give adequate gain for use as amplifier
- ››Developed new gain element for LIGO laser
- ››Doubled number of gain elements to achieve 10 W power

LIGO Lasers: Future Needs

- **Initial order of three lasers (apparently sufficient for three interferometers) does not meet long term needs**
 - ›› Spares for each site plus developmental units for campuses
 - ›› Probably want 8-10 lasers for LIGO Lab by beginning of operations
- **Maintenance of production capability: tooling, build procedures, component suppliers**
- **Benefits of continued development program: can expect significant product improvements during early production runs**
 - ›› Example: First deliverable laser gave 9.7 W, second unit gave 12.6 W
 - ›› Investigation of potential product improvements

LIGO Lasers: Proposed Change Order

- **Exercise option for 2 lasers at \$100,000 each**
 - ››FFP
 - ››Same specs, warranty as basic production lasers
 - ››Delivery as soon as possible
- **Defined level of support, enhancement, and continuing production**
 - ››CPFF appropriate for support and enhancement effort
 - ››CPFF for continuing production reduces company resistance to improvements in laser design
 - ››Laser production estimate based on current parts list, 1/3 person-year labor for production
 - ››Materials for support/enhancement R&D based on Lightwave experience (~equal to direct labor cost) + LIGO-defined spares budget
- **Close supervision by Jordan Camp**
 - ››Regular telephone calls, meetings, reports

Summary

- **Contract assures adequate quantity of (interchangeable) 10 W lasers**
- **Maintains needed base of support for servicing**
- **Provides for continued development of LIGO laser design to meet initial detector requirements**