

R&D for AdLIGO ASC Detectors

LSC Meeting August 2006

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- **In Vacuum Detectors**
- **Lower Front-end Noise**
- **Higher Optical Power**
- **Higher Modulation Frequencies**
 - » Up to 100MHz
- **Down-select of Candidate InGaAs Diodes**

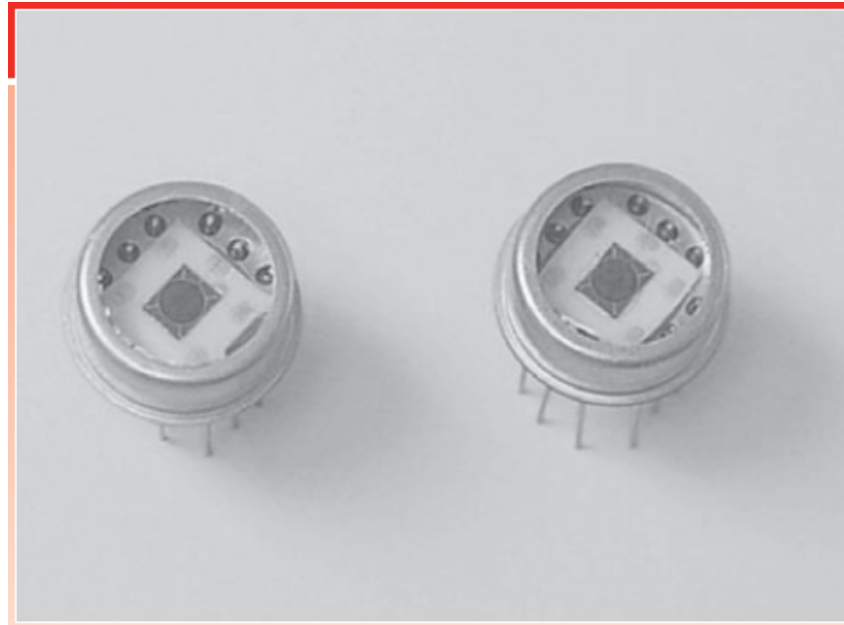
- **In-vacuum Detectors**
 - » **Circuitry mounted on the back of a conflat using Zero-length flanges as spacer**
 - » **Photo-detector is in vacuum and feeds through flange with electrical feed-through**
 - » **Electrical connectors mounted on opposing conflat flange**



- **So far, 4 Quad-diodes have been purchased**
 - » **Hamamatsu G6849, 2mm diode**
 - » **OSI Optoelectronics Inc. Q3000, 3mm diode**
 - » **Electro-Optical Systems Inc. IGA-020-QD, 2mm diode**
 - » **Electro-Optical Systems Inc. IGA-030-QD, 3mm diode**
- **Test jigs for each diode have been prepared**
- **Some very preliminary data has been taken on the Q3000**
 - » **At -5V reverse bias and a test frequency of 70MHz, the diode segment is represented by a $\sim 30\text{pF} - 20\Omega$ series circuit**
 - » **The diode was resonated with an inductor which resulted in a 70MHz resonant peak having a quality factor (Q) of ~ 2**
 - » **This test yields a transimpedance of $\sim 100\Omega$**

- **The test program for the down-select of photo-diodes should include**
 - » **Equivalent circuit model vs. frequency**
 - » **Cross-talk from segment to segment**
 - » **Thermal performance data**
 - » **Capacitance vs. reverse bias data**
 - » **Performance of diode when resonated as evaluated with AM modulated laser setup**

- Q3000 OSI 3mm photo-detector



- All 4 candidate diodes on a single board with symmetric traces to test connectors (other side of this view)

