

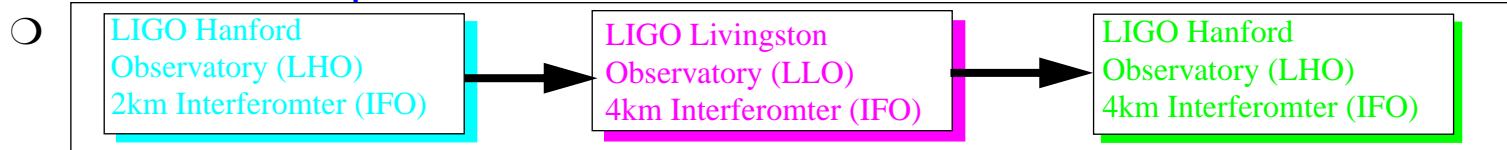
# Detector Installation Plan

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- ❑ Plan
- ❑ Management
- ❑ Schedule
- ❑ Staffing

# Detector Installation Plan Overview

## Interferometer Sequence:



- 2km IFO is First Since It's Easier to Align & Can be Debugged in Parallel with 4km IFO Installation
- LLO 4km IFO is Second Since Facility and Staff are Available
- 2nd and 3rd IFOs benefit from Debug/Commissioning on the Earlier IFOs

## Boundary Conditions:

- Management Plan:
  - Initiate Interferometer Installation 07/98
  - First Coincidence Run ( $h < 10^{-20}$ ) 12/00
  - Design Sensitivity ( $h < 10^{-21}$ ) 11/01
- Vacuum Equipment Completion Dates (as of 2/28/98):
  - LIGO Hanford Observatory (LHO) 7/30/98
  - LIGO Livingston Observatory (LLO) 1/7/99
- Detector Subsystem Delivery Dates
- No reliance upon the BT Availability (due to BT bakeout) for alignment of Core Optics

## Guidelines:

- Need ~12 months for Debug & Commissioning of Interferometers (Operations Proposal)
- Use Observatory Staff as Much as Possible
- Team Approach

# Management

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## □ Detector Integration and Test Organization

- The Detector Group Manages to the Deliverable Definition & Schedule (Detector's "interface" with Integration)
- Detector Integration is "Observatory-Centric"
  - EXECUTION:  
Day-to-Day On-Site Staff Direction & Tracking (per the installation plan) is the Observatory Director's Responsibility (F. Raab & M. Coles)
  - PLANNING/COORDINATION:  
Detector Chief Engineer/Integration Manager's Responsibility (D. Coyne):
    - Work-Around Planning
    - Technical/Scientific Integration Support Staff Coordination

## □ Support to Detector Integration and Test

- Detector Design Staff Migrates to Support the Integration Effort
  - During Integration peaks, ~1/2 the Detector Staff will be on-site at the observatories
  - Detector Staff Continues to Support the Detector Design, Fabrication, Assembly & Test
- Subsystem Teams (with Observatory Site members) Execute the Installation
  - Teaming Helps Technology Transfer & Training of Observatory Staff
  - Teaming Helps Relieve Travel burden of University-based Detector Staff

# Detector Integration

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## ❑ Configuration Management

- Document Change Notice (DCN) Process
- Material Review Board (MRB)
- Configuration Control Board (CCB)
- Technical Review Board (TRB)

## ❑ Interface Control

- Interface Documents for Major Project Subsystems
- Interfaces Addressed in Each Detector Subsystem Requirements Document
- Integrated Layout Drawings
  - Optomechanical
  - Equipment Arrangement

## ❑ Conflict Resolution

- LIGO Management has a Demonstrated Ability (in Facility Construction) to Resolve Inevitable Conflicts /Problems which will Arise During Installation & Commissioning
- Detector Team Involved with Design and Fabrication are also Responsible for the Installation and Integration

# LIGO DETECTOR INSTALLATION -- TOP LEVEL

ID	Task Name	Duration	Start	Finish	1998			1999				2000				2001				
					Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
1	VE Completion	194d	3/11/98	12/8/98																
11	BT Bake Out	374d	9/15/98	2/21/00																
21	LHO Detector Infrastructure	80w	7/27/98	2/4/00																
22	LHO 2km IFO	525d	7/27/98	7/28/00																
23	Install SEI, SUS, COS, ISC	51w	7/27/98	7/16/99																
24	PSL	10w	7/27/98	10/2/98																
25	Input Optics	30w	7/27/98	2/19/99																
26	PR Near Michelson	30w	2/22/99	9/17/99																
27	PR Michelson w/ FP Arms	45w	9/20/99	7/28/00																
28	LHO 4km IFO	593d	7/1/98	10/6/00																
29	Start Detector Integration	0d	7/1/98	7/1/98																
30	Install SEI, SUS, COS, ISC	60w	7/1/98	8/24/99																
31	PSL	8w	5/10/99	7/2/99																
32	Input Optics	15w	8/16/99	11/26/99																
33	PR Near Michelson	15w	11/29/99	3/10/00																
34	PR Michelson w/ FP Arms	30w	3/13/00	10/6/00																
35	LLO Detector Infrastructure	80w	12/8/98	6/19/00																
36	LLO 4km IFO	443d	1/6/99	9/15/00																
37	Install SEI, SUS, COS, ISC	39w	1/6/99	10/5/99																
38	PSL	8w	3/15/99	5/7/99																
39	Input Optics	25w	2/22/99	8/13/99																
40	PR Near Michelson	19w	8/16/99	12/24/99																
41	PR Michelson w/ FP Arms	38w	12/27/99	9/15/00																
42	Detector Commissioned ( $h < 10^{-20}$ )	0d	10/6/00	10/6/00																
43	Observatory Operations & improve	56w	10/9/00	11/2/01																
44	Design Sensitivity ( $h < 10^{-21}$ )	0d	11/2/01	11/2/01																

# INTEGRATION STAFFING

Physical Integration & Hardware Commissioning Staff  
(Does not include LDAS, GDS, Operations)

