



## Core Optics (COC)

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- **Items to be stored :**
  - » Two (2) End Reaction Mass (ERM) *Store @ CIT*
  - » Four (4) Penultimate Masses (PM) *Store @ LHO*
  - » Four (4) Test Masses (ITM and ETM)
  - » Two (2) Compensation Plates (CP)
  - » One (1) Beamsplitter (BS)
  - » Two (2) Recycling Telescope Mirrors (PRM and SRM)
- **Specific concerns/requirements:**
  - » Particulate and hydrocarbon contamination of optics and optical coatings
  - » Degradation of gold plating on fused silica or glass substrates
  - » Store so as to minimize number of cleanings after storage
- **Storage particulars**
  - » Optics in their existing containers will be placed into designated storage in clean lab space (in air)

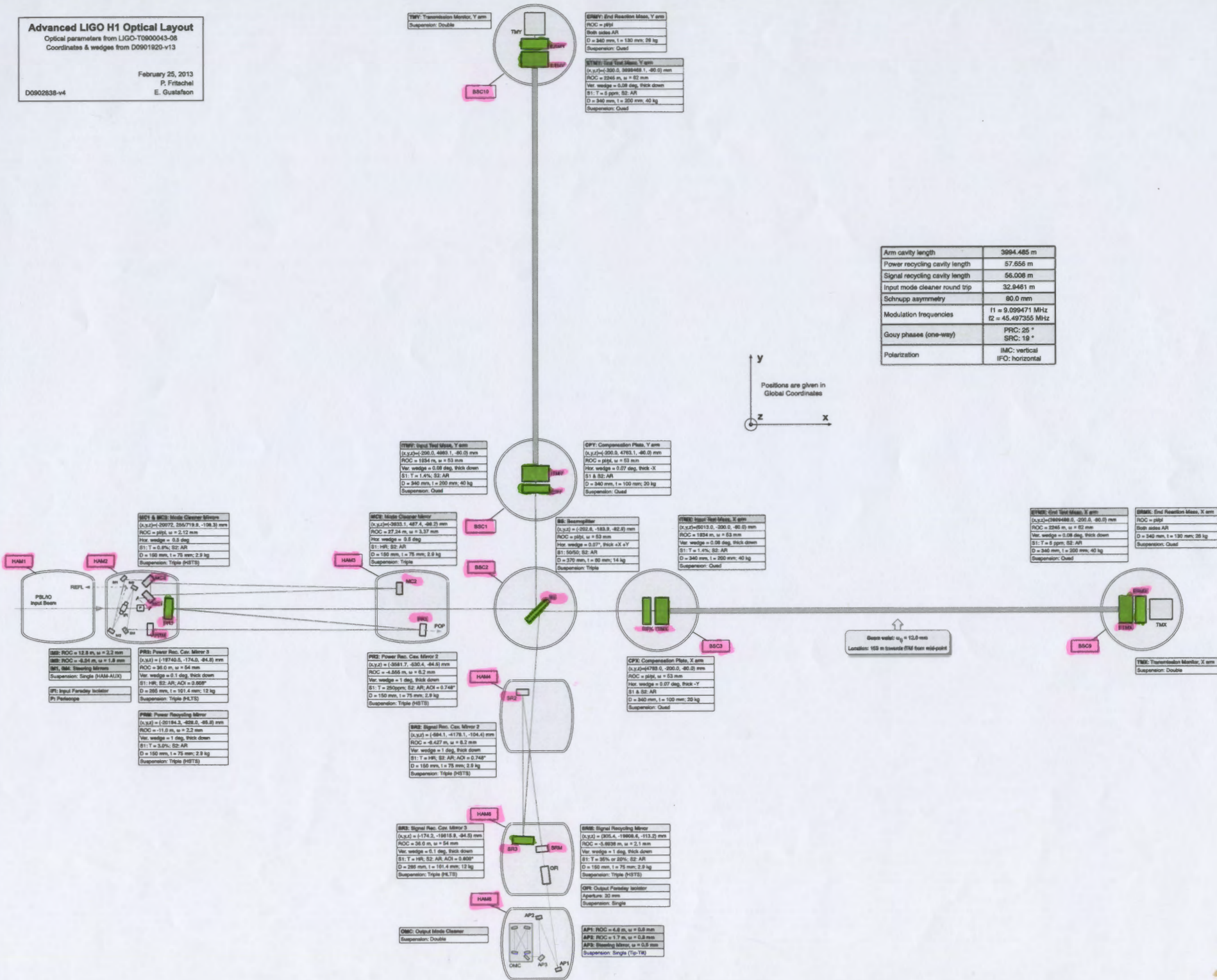
} *Store @ CIT*

# Advanced LIGO H1 Optical Layout

Optical parameters from LIGO-T000043-08  
Coordinates & wedges from D0901920-v13

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D0902838-v4



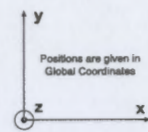
**EMW1: End Resonator Mirror, Y arm**  
ROC =  $\mu\mu\mu$   
Both sides AR  
D = 340 mm, L = 130 mm; 28 kg  
Suspension: Quad

**EMW2: End Resonator Mirror, X arm**  
(x,y,z) = (-350.0, 3888.48, 1, 40.0) mm  
ROC = 2246 m,  $\omega = 82$  mm  
Hor. wedge = 0.08 deg, thick down  
S1: T = 0 ppm, S2: AR  
D = 340 mm, L = 200 mm; 40 kg  
Suspension: Quad

**TM1: Transmission Monitor, Y arm**  
Suspension: Double

BSC10

Arm cavity length	3994.485 m
Power recycling cavity length	57.556 m
Signal recycling cavity length	56.008 m
Input mode cleaner round trip	32.9461 m
Schrupp asymmetry	80.0 mm
Modulation frequencies	f1 = 9.029471 MHz f2 = 45.497355 MHz
Gouy phases (one-way)	PRC: 25 ° SRC: 19 °
Polarization	IMC: vertical IFO: horizontal



Beam waist:  $w_0 = 12.6$  mm  
Location: 163 m towards IEM from mid-point

**EMW2: End Resonator Mirror, X arm**  
(x,y,z) = (350.0, 3888.48, 0, 200.0, 40.0) mm  
ROC = 2246 m,  $\omega = 82$  mm  
Both sides AR  
D = 340 mm, L = 130 mm; 28 kg  
Suspension: Quad

**TM2: Transmission Monitor, X arm**  
Suspension: Double

**CP1: Compensation Plate, Y arm**  
(x,y,z) = (-200.0, 4793.1, 40.0) mm  
ROC =  $\mu\mu\mu$ ,  $\omega = 63$  mm  
Hor. wedge = 0.07 deg, thick -X  
S1 & S2: AR  
D = 340 mm, L = 100 mm; 20 kg  
Suspension: Quad

**TM1: Signal Rec. Cas. Mirror 3**  
(x,y,z) = (200.0, 4883.1, 40.0) mm  
ROC = 1834 m,  $\omega = 63$  mm  
Hor. wedge = 0.08 deg, thick down  
S1: T = 1.4%, S2: AR  
D = 340 mm, L = 200 mm; 40 kg  
Suspension: Quad

**MR: Beam splitter**  
(x,y,z) = (-202.0, 183.9, 42.0) mm  
ROC =  $\mu\mu\mu$ ,  $\omega = 63$  mm  
Hor. wedge = 0.07, thick -x + y  
S1: T = 50%, S2: AR  
D = 370 mm, L = 80 mm; 14 kg  
Suspension: Triple

**FM1: Input Test Mass, X arm**  
(x,y,z) = (6013.0, -200.0, 40.0) mm  
ROC = 1834 m,  $\omega = 63$  mm  
Hor. wedge = 0.08 deg, thick down  
S1: T = 1.4%, S2: AR  
D = 340 mm, L = 200 mm; 40 kg  
Suspension: Quad

**MC1 & MC2: Mode Cleaner Mirrors**  
(x,y,z) = (3007.0, 2607.9, 0, -198.0) mm  
ROC =  $\mu\mu\mu$ ,  $\omega = 2, 12$  mm  
Hor. wedge = 0.5 deg  
S1: T = 0.5%, S2: AR  
D = 180 mm, L = 75 mm; 2.9 kg  
Suspension: Triple (HSTS)

**MC1: Mode Cleaner Mirror**  
(x,y,z) = (-3633.1, 487.4, 48.0) mm  
ROC = 27.24 m,  $\omega = 3, 37$  mm  
Hor. wedge = 0.8 deg, thick down  
S1: HR, S2: AR  
D = 150 mm, L = 75 mm; 2.9 kg  
Suspension: Triple

**PR2: Power Rec. Cas. Mirror 2**  
(x,y,z) = (-3681.7, 430.4, 44.4) mm  
ROC = -4.856 m,  $\omega = 6.2$  mm  
Hor. wedge = 1 deg, thick down  
S1: T = 200ppm, S2: AR, ACH = 0.748°  
D = 150 mm, L = 75 mm; 2.9 kg  
Suspension: Triple (HSTS)

**CP1: Compensation Plate, X arm**  
(x,y,z) = (4738.0, -200.0, 40.0) mm  
ROC =  $\mu\mu\mu$ ,  $\omega = 63$  mm  
Hor. wedge = 0.07 deg, thick -Y  
S1 & S2: AR  
D = 340 mm, L = 100 mm; 20 kg  
Suspension: Quad

**MR3: Signal Rec. Cas. Mirror 3**  
(x,y,z) = (-484.1, -1178.1, -104.4) mm  
ROC = -6.427 m,  $\omega = 6.2$  mm  
Hor. wedge = 1 deg, thick down  
S1: T = HR, S2: AR, ACH = 0.748°  
D = 160 mm, L = 75 mm; 2.9 kg  
Suspension: Triple (HSTS)

**MR2: Signal Recycling Mirror**  
(x,y,z) = (2075.4, -1890.6, -113.2) mm  
ROC = -0.9928 m,  $\omega = 2, 2.1$  mm  
Hor. wedge = 1 deg, thick down  
S1: T = 35% or 20%, S2: AR  
D = 180 mm, L = 75 mm; 2.9 kg  
Suspension: Triple (HSTS)

**MR3: Signal Rec. Cas. Mirror 3**  
(x,y,z) = (-174.2, -19818.9, -84.0) mm  
ROC = 28.0 m,  $\omega = 5.4$  mm  
Hor. wedge = 0.1 deg, thick down  
S1: T = HR, S2: AR, ACH = 0.4038°  
D = 285 mm, L = 101.4 mm; 12 kg  
Suspension: Triple (HSTS)

**AP1: Output Faraday Isolator**  
Aperture: 30 mm  
Suspension: Single

**OMC: Output Mode Cleaner**  
Suspension: Double

**PR3: Power Rec. Cas. Mirror 3**  
(x,y,z) = (-17940.0, 1746.0, 44.4) mm  
ROC = 38.0 m,  $\omega = 5.4$  mm  
Hor. wedge = 0.1 deg, thick down  
S1: HR, S2: AR, ACH = 0.900°  
D = 285 mm, L = 101.4 mm; 12 kg  
Suspension: Triple (HSTS)

**PR2: Power Recycling Mirror**  
(x,y,z) = (-20184.2, 459.0, 45.0) mm  
ROC = 11.0 m,  $\omega = 2, 2$  mm  
Hor. wedge = 1 deg, thick down  
S1: T = 3.0%, S2: AR  
D = 180 mm, L = 75 mm; 2.9 kg  
Suspension: Triple (HSTS)

**MR2: Signal Recycling Mirror**  
(x,y,z) = (174.2, -19818.9, -84.0) mm  
ROC = 28.0 m,  $\omega = 5.4$  mm  
Hor. wedge = 0.1 deg, thick down  
S1: T = HR, S2: AR, ACH = 0.4038°  
D = 285 mm, L = 101.4 mm; 12 kg  
Suspension: Triple (HSTS)

**AP1: Output Faraday Isolator**  
Aperture: 30 mm  
Suspension: Single

**AP1: ROC = 4.8 m,  $\omega = 0.8$  mm**  
**MR2: ROC = 1.7 m,  $\omega = 0.8$  mm**  
**MR3: Beam splitter,  $\omega = 0.5$  mm**  
Suspension: Single (Tip-Tilt)