

L1 Interferometer Resonances

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Beamsplitter, ITMs, ETMs, Recycling Mirror, MMT3 Mirror, Small Optic Suspensions, Optical Levers, Violin Modes, Magnet Standoff Assembly, PSL Periscope **Resonances**, HAM, BSC, LHO References, Internal Modes

Beamsplitter (BS) Resonances (L1)

INTERNAL RESONANCES					
Description	f_{th}(Hz)	f_{meas}(Hz)	Q_{th}	Q_{meas}	References
PENDULAR RESONANCES					
in-beam pendular	0.744	0.764			
sideways pendular		0.732			
pitch	0.600	0.625			
yaw	0.500	0.502			
vertical(bounce)	~12.8	12.58			
roll	~18.1	18.59			
violin	223				
INTERNAL RESONANCES					
butterfly		3726.382		>10 ⁶	

Input Test Mass (ITM) Resonances (L1)

L1 ITM_x

Description	$f_{th}(\text{Hz})$	$f_{meas}(\text{Hz})$	Q_{th}	Q_{meas}	References
PENDULAR RESONANCES					
violin	346.646				SJW ilog 8/24/06
violin	347.036				SJW ilog 8/24/06
pendular	0.743	0.760			
pitch	0.600	0.625			
yaw	0.499	0.502			
side		0.730			
vertical(bounce)	12.72	11.87			
violin(I)	339	346.644		7771	
violin(II)	339	347.034		7771	
roll	18.18				
INTERNAL RESONANCES					3
Mode Number 7		6695.878		$4.15 \cdot 10^5$	
Mode Number 8		6696.281		$4.57 \cdot 10^5$	
Mode Number 9		9327.594		$9.13 \cdot 10^5$	
Mode Number 10		11200.656		$6.41 \cdot 10^6$	
Mode Number 14		12545.938		$6.07 \cdot 10^6$	
Mode Number 16		14372.938		$1.24 \cdot 10^7$	
Mode Number 17		15055.513		$6.85 \cdot 10^6$	
Mode Number 18		15055.969		$6.34 \cdot 10^6$	
Mode Number 19		17118.406		$1.09 \cdot 10^7$	
Mode Number 20		17119.344		$1.82 \cdot 10^6$	
Mode Number 32		22343.031		$1.762 \cdot 10^6$	

L1 ITMy

Description	f_{th} (Hz)	f_{meas} (Hz)	Q_{th}	Q_{meas}	References
PENDULAR RESONANCES					
violin	346.915				SJW ilog 8/24/06
violin	346.964				SJW ilog 8/24/06
pendular	0.743	0.760			
pitch	0.600	0.615			
yaw	0.499	0.504			
side		0.732			
vertical(bounce)	12.72	11.89			
violin(I)	339	346.912			
violin(II)	339	346.959			
roll	18.18				
INTERNAL RESONANCES					3
butterfly(I)		6640.275		$3.1 \cdot 10^6$	
butterfly(II)		6640.726		$1.10 \cdot 10^6$	
Mode Number 9		9326.67		$9.86 \cdot 10^5$	
Mode Number 16		14368.666		$5.78 \cdot 10^6$	

End Test Mass (ETM) Resonances (L1)

L1 ETMx

Description	f_{th} (Hz)	f_{meas} (Hz)	Q_{th}	Q_{meas}	References
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PENDULAR RESONANCES					
violin	343.091				SJW ilog 8/24/06
violin	343.624				SJW ilog 8/24/06
pendular	0.744	0.766			
pitch	0.600	0.625			
yaw	0.500	0.498			
side		0.732			
vertical(bounce)	12.85	12.01			
violin(I)	336	343.089		57700	
violin(II)	336	343.654		86200	
roll	18.18				
INTERNAL RESONANCES					
butterfly(I)		6648.05			
butterfly(II)		6648.62			
Mode Number ?		9264.75		3×10^5	

L1 ETMy

Description	f_{th} (Hz)	f_{meas} (Hz)	Q_{th}	Q_{meas}	References
PENDULAR RESONANCES					
violin	343.474				SJW ilog 8/24/06
violin	344.415				SJW ilog 8/24/06
pendular	0.744	0.756			

pitch	0.600	0.678			
yaw	0.500	0.490			
side		0.730			
vertical(bounce)	12.85	12.03			
violin	336				
roll	18.18				
INTERNAL RESONANCES					
butterfly(I)		6640.13		$2.34 \cdot 10^6$	
butterfly(II)		6640.58		$8.79 \cdot 10^5$	
Mode Number ?		6640.8125		$8 \cdot 10^5$	
Mode Number ?		6640.375		$3 \cdot 10^6$	
Mode Number ?		9356.5		$7 \cdot 10^5$	
Mode Number ?		14376.5625		$6 \cdot 10^6$	

Recycling Mirror (RM) Resonances (L1)

Description	$f_{th}(\text{Hz})$	$f_{meas}(\text{Hz})$	Q_{th}	Q_{meas}	References
PENDULAR RESONANCES					
pendular	0.741	0.760			
pitch	0.600	0.627			
yaw	0.501	0.508			
side		0.728			
vertical(bounce)	12.86	12.38			
roll	18.18	16.00			
violin	334	335.4			

INTERNAL RESONANCES					
drumhead	?	5469.91	10^6	?	Rana LLO ilog May 24, 2009

MMT3 Mirror (MMT3) Resonances (L1)

Description	f_{th} (Hz)	f_{meas} (Hz)	Q_{th}	Q_{meas}	References
PENDULAR RESONANCES					
pendular		0.762			
sideways pendular					
pitch		0.627			
yaw		0.506			
side		0.732			
vertical(bounce)		12.32			
roll	18.18				
violin					
INTERNAL RESONANCES					

Small Optic Suspension (SOS) Resonances (L1)

Description	f_{th} (Hz)	f_{meas} (Hz)	Q_{th}	Q_{meas}	References
ASSOCIATED RESONANCES					
Dumbbell Assembly		9700		130	-/15/-/-
Suspension Support Structure		156			-/15/-/-

PENDULAR RESONANCES					
mc1					
pendular	1.0	.981		4000	15/26/-/-
sideways pendular		.996		8700	-/26/-/-
pitch	.75	.802		2400	15/26/-/-
yaw	.85	.837		2000	15/26/-/-
mc2					
pendular	1.0	.976		4000	15/26/-/-
sideways pendular		.994		5800	-/26/-/-
pitch	.75	.735		1800	15/26/-/-
yaw	.85	.823		2200	15/26/-/-
mc3					
pendular	1.0	.992		4500	15/26/-/-
sideways pendular		.997		6800	-/26/-/-
pitch	.75	.799		1300	15/26/-/-
yaw	.85	.858		1400	15/26/-/-
mmt1					
pendular	1.0	.980		2600	15/26/-/-
sideways pendular		.992		6100	-/26/-/-
pitch	.75	.791			15/26/-/-
yaw	.85	.825		1600	15/26/-/-
mmmt2					
pendular	1.0	.978		2600	15/26/-/-
sideways pendular		.992		6100	-/26/-/-
pitch	.75	.750		1500	15/26/-/-

yaw	.85	.820		1000	15/26/-/-
sm					
pendular	1.0	.997			15/26/-/-
sideways pendular		.992			-/26/-/-
pitch	.75	.830			15/26/-/-
yaw	.85	.861			15/26/-/-
vertical	16.0	16.282			15/13/-/-
roll		23.026			-/-/-/-
violin1		708.30		2.2×10^5	-/13/-/13
violin2		1416.34		1.3×10^6	-/13/-/13

Optical Lever Resonances (L1)

Location	frequency(Hz)	FWHM	References (date of measurement)
MMT3	12.6,44.1,88.5,133,143,221,233	1,<.1,<.1,<.1,7,1,2	22/22 (July 24, 2003)
RM	9.9,12.6,37.4	2, 1.5	22/22(July 23, 2003)
BS	18.6,100.7,153,218.3,328	_,2,2,2,1	22/22 (July 29, 2003)
ITMx	17.8,25.6,47.8,154,185.6	2.3,2.7,1.2,5,1.8	22/22 (July 22, 2003)
ITMy	27.9,35.2,41.9,266.3,269.1,313.9	1.5,1.6,2.4,1.3,1.8,1.6	22/22 (July 23,2003)
ETMx	24.1,29.6,45.1,69.5,94.6,139.8,146.1,170.5	2.5,2.2,2.3,3,1.6,_,1.7	22/22 (July 23,2003)
ETMy	24.8,28,51,63.5,107.5,200.5,477	2,2.5,3,3,2,2,1	22/22(July 23,2003)

Violin Mode Resonances (L1)

Frequency	Q Value	Sources	References
223		Beamsplitter Pendular Resonance (H2 & H1)	3
334		RM Pendular Resonance (H1)	3
335.82		RM?	eolog: 1/21/2002
336.062		ETM _x	eolog: 4/19/2002
339		ITM Pendular Resonances (H1)	3
339.72		ETM _y	eolog: 4/19/2002
343		BS, SM, MMT1_LR, MC2_LR, ITM _y ?	eolog: 8/27/2002
343.413		ETM _x	eolog: 12/3/2002
343.4152	8.806e4	BS, MC3_LL, MMT1	23
343.4156	1.141e5		eolog: 8/12/2002
343.42		ETM _x	eolog: 12/2/2002
343.93		ITM _x , RM, MC2_LR?	eolog: 2/5/2002
343.94		ETM _x	eolog: 12/2/2002
344.06		ETM _x	eolog: 12/2/2002
344.0608	10.752e4	ITM _y ?	23
344.0609	1.022e5		eolog: 8/12
344.7156	21.545e4		23
344.7162	1.242e5		eolog: 8/12
344.8299	9.579e4	MMT1_LL,MMT_LR,RM?	23
344.8302	1.437e5		eolog: 8/12
347.17		ITM _x	eolog: 12/2/2002
347.1790	13.353e4	BS, ETM _x ?	23
347.1798	1.551e5		eolog: 8/12
347.27		ITM _x	eolog: 12/2/2002

347.2719	23.151e4	RM,MMT2_LL?	23
347.2724	1.170e5		eelog: 8/12
347.6809	1.607e4		eelog: 8/12
347.6847	1.830e4	ITMy?	23
347.7		ITMy	eelog: 4/26/2002
347.7300	1.656e4	MC1_LL,MC2_LR,MMT2_LL,SM?	23
347.7334	2.037e4		eelog: 8/12
686.9169			23
686.9176	1.313e5		eelog: 8/12
688		Violin Resonance Y-arm	eelog: 12/4/2002
688.2850			23
688.2860	1.689e5		eelog: 8/12
689.5115			23
689.5120	8.445e4		eelog: 8/12
689.7416			23
689.7431	4.728e4		eelog: 8/12
694.2828			23
694.2841	1.777e5		eelog: 8/12
694.5960			23
695.5974	1.069e5		eelog: 8/12
695.4212	1.440e5		eelog: 8/12
695.4199			23
695.4811			23
695.4828	1.503e5		eelog: 8/12
708.30		Small optics suspension system resonances	13

1030.5585			23
1030.5599	1.000e5		elog: 8/12
1032.5874			23
1032.5884	1.000e5		elog: 8/12
1032.5908			23
1034.4276	1.001e5		elog: 8/12
1034.4598			23
1034.8027			23
1034.8040	1.000e5		elog: 8/12
1041.6249			23
1041.6267	1.777e5		elog: 8/12
1042.1226			23
1042.1253	1.348e5		elog: 8/12
1043.3230			23
1043.3256	1.894e5		elog: 8/12
1043.4469			23
1043.4484	2.009e5		elog: 8/12
1416.34		Small optics suspension system resonances	13

Internal Mode Resonances (L1)

Frequency	Q Value	Sources	References
3726.382	$>10^6$	BS butterfly	
6497.55		RM butterfly	
6640.13	$2.34 \cdot 10^6$	ETMY butterfly(I)	

6640.275	3.1×10^6	ITMY butterfly(I)	
6640.375	3×10^6	ETMY mode ?	
6640.58	8.79×10^5	ETMY butterfly(II)	
6640.726	1.10×10^6	ITMY butterfly(II)	
6640.8125	8×10^5	ETMY mode ?	
6648.05		ETMX butterfly(I)	
6648.62		ETMX butterfly(II)	
6695.878	4.15×10^5	ITMX mode 7	
6696.281	4.57×10^5	ITMX mode 8	
9264.75	3×10^5	ETMX mode ?	
9326.67	9.86×10^5	ITMY mode 9	
9327.594	9.13×10^5	ITMX mode 9	
9356.5	7×10^5	ETMY mode ?	
11200.656	6.41×10^6	ITMX mode 10	
12545.938	6.07×10^6	ITMX mode 14	
14368.666	5.78×10^6	ITMY mode 16	
14372.938	1.24×10^7	ITMX mode 16	
14376.5625	6×10^6	ETMY mode 16	
14389.0	$> 2 \times 10^6$	ETMX mode 16	
15055.513	6.85×10^6	ITMX mode 17	
15055.969	6.34×10^6	ITMX mode 18	
17118.406	1.09×10^7	ITMX mode 19	
17119.344	1.82×10^6	ITMX mode 20	
22343.031	1.762×10^6	ITMX mode 32	