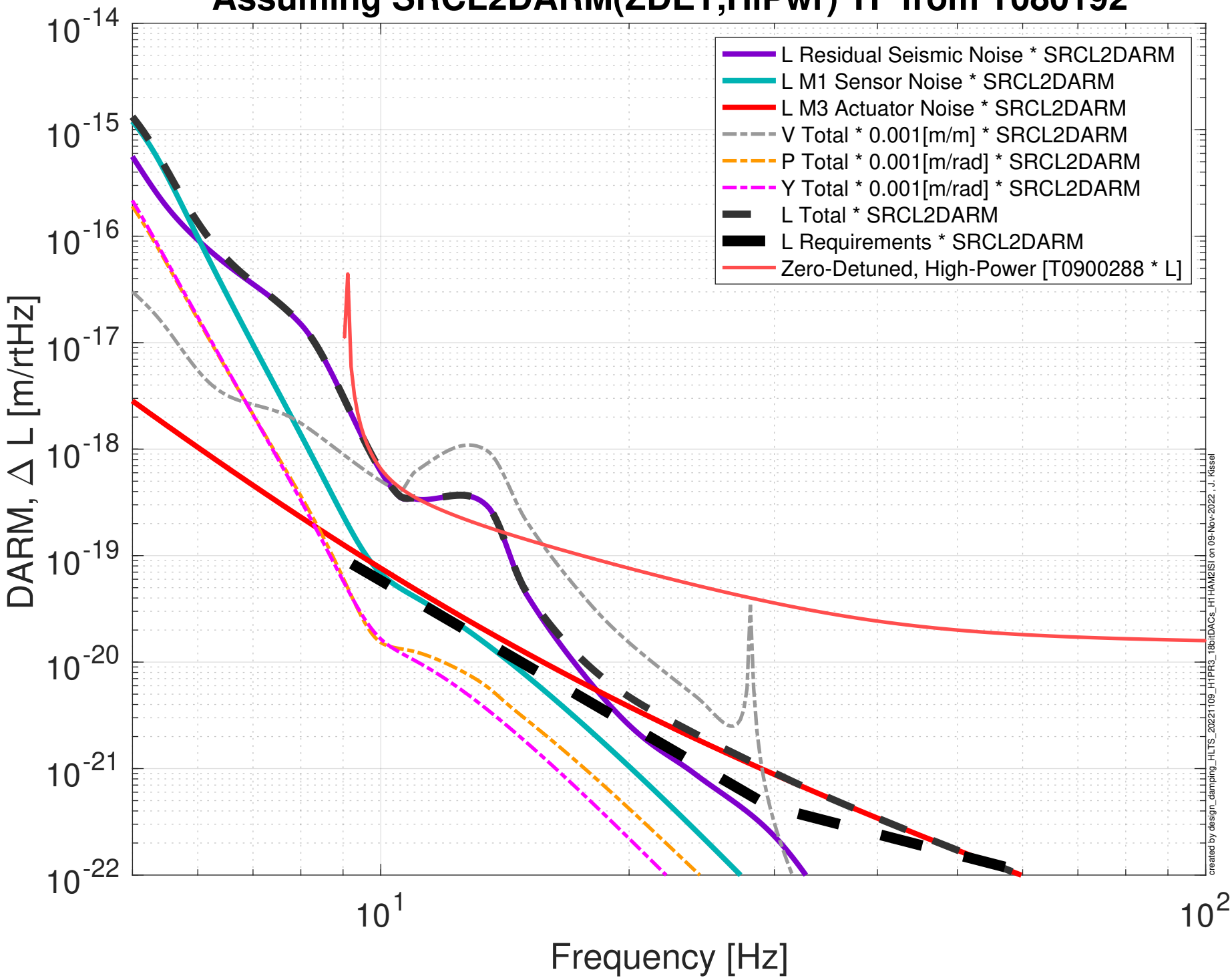
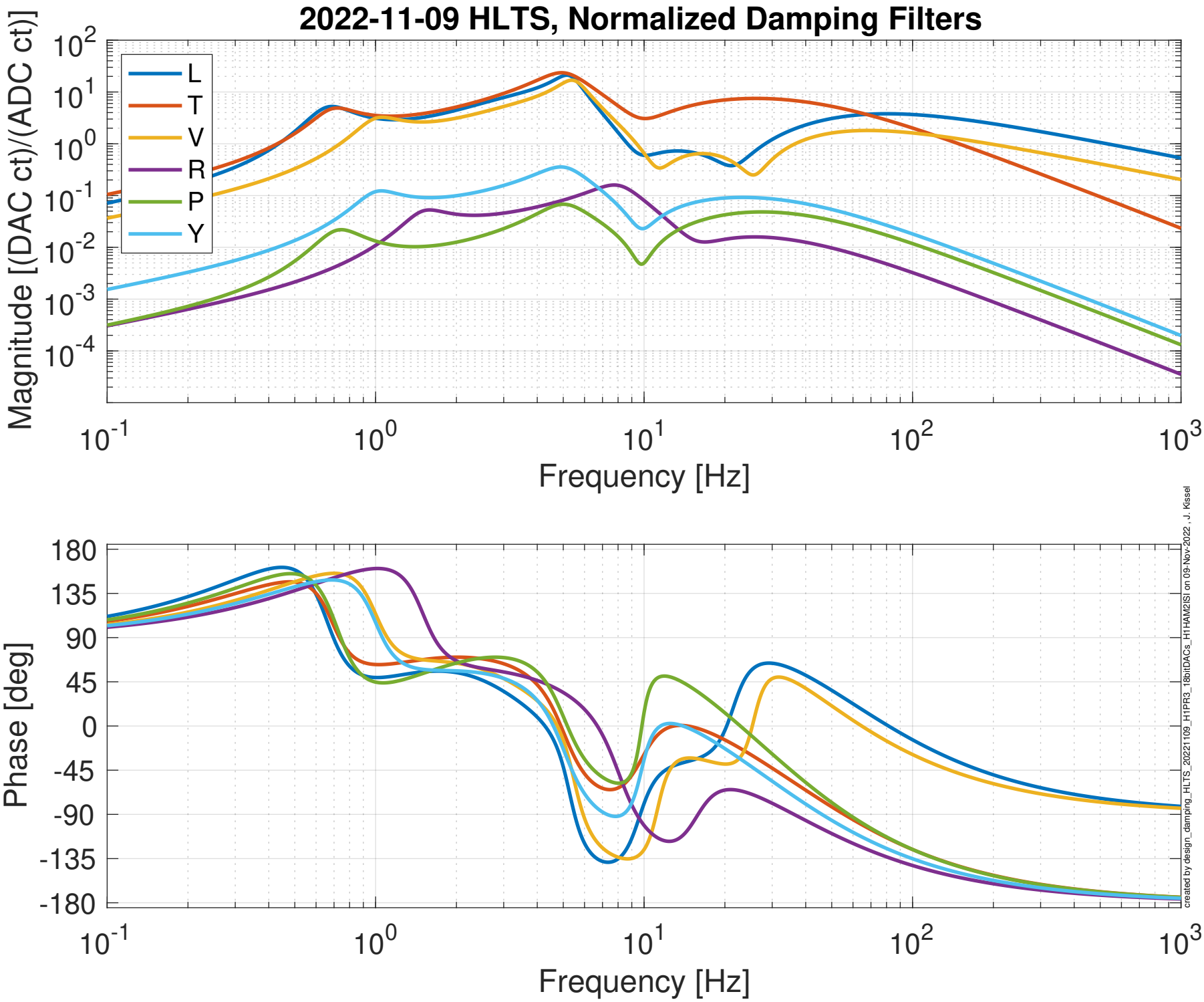
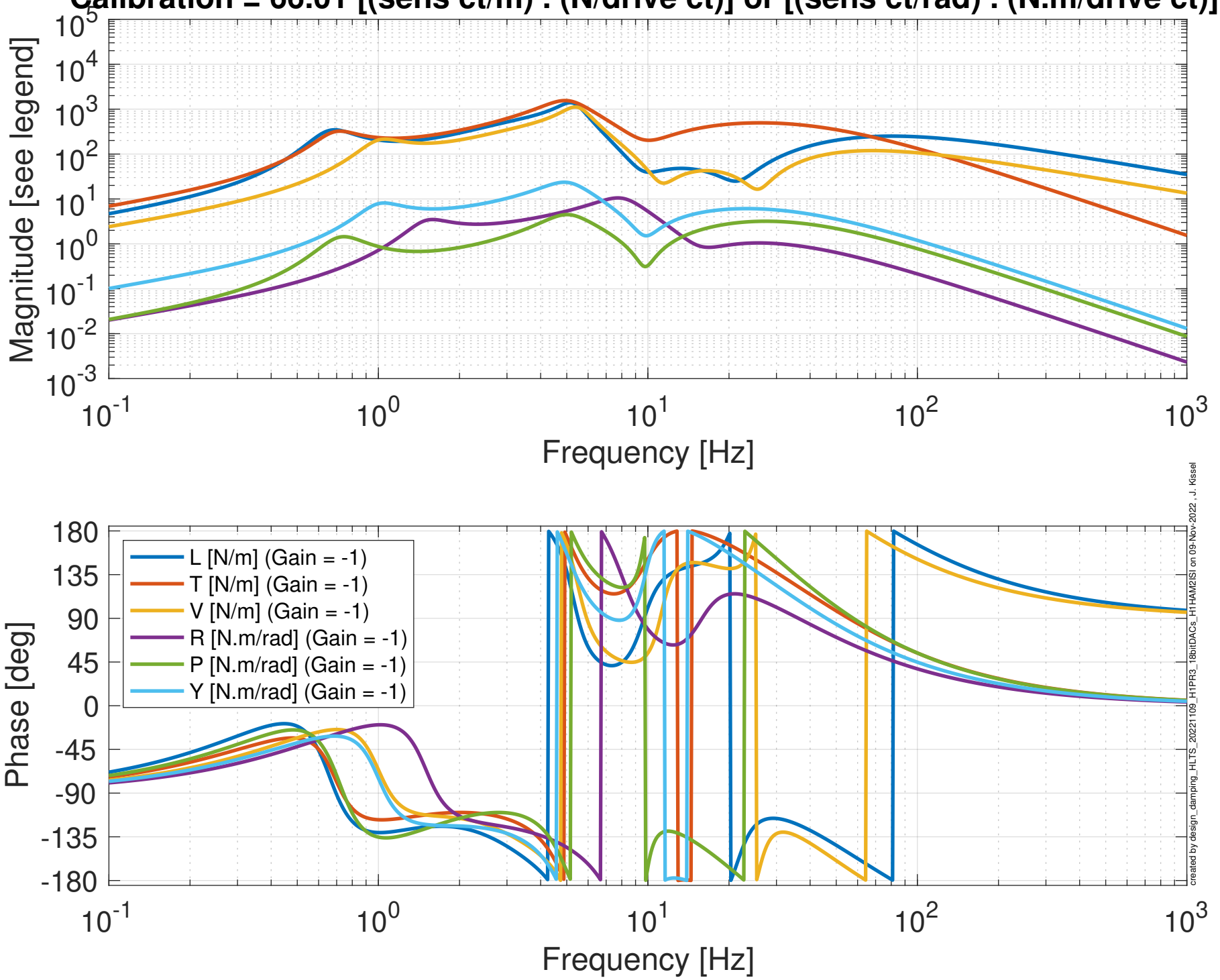
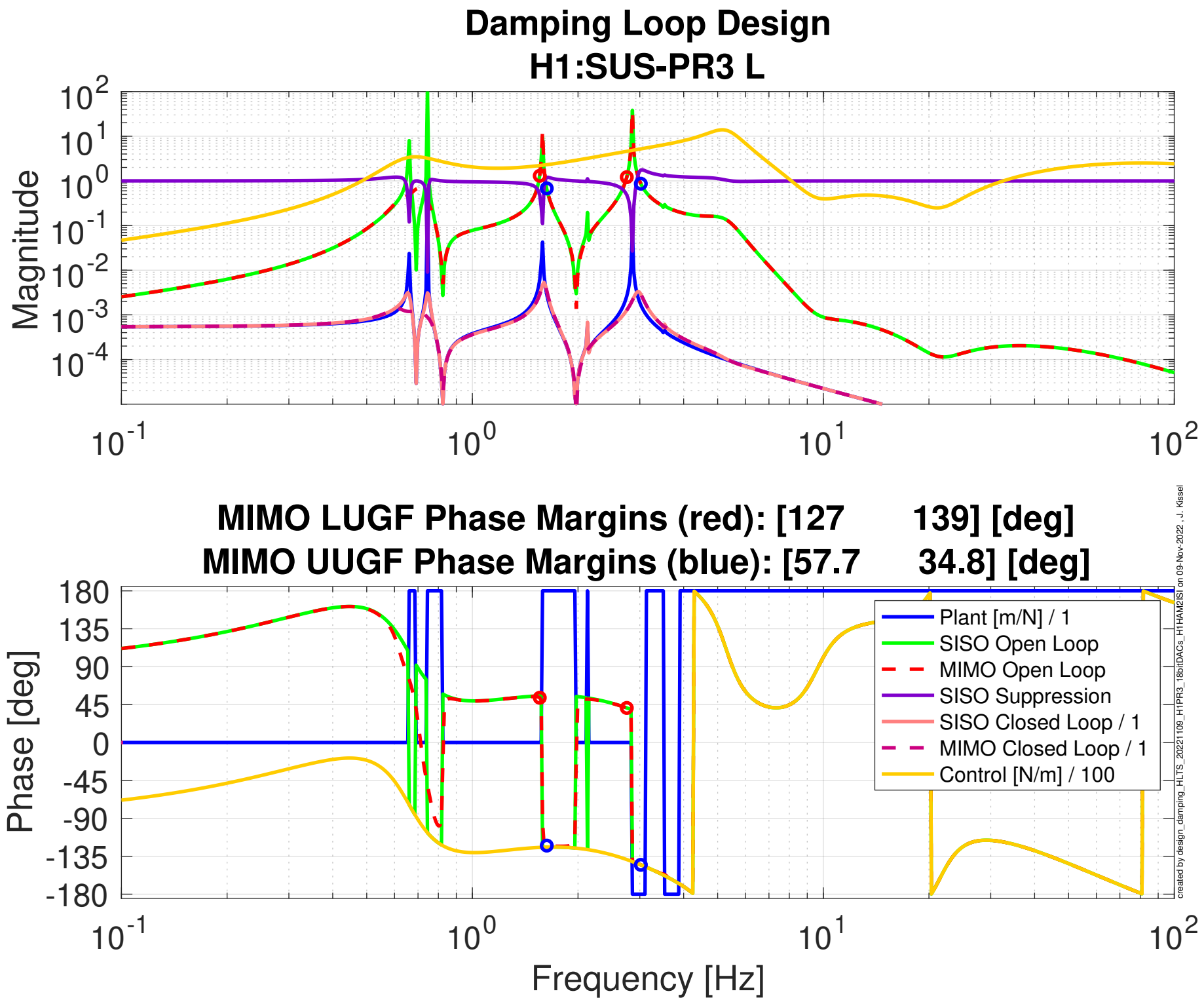
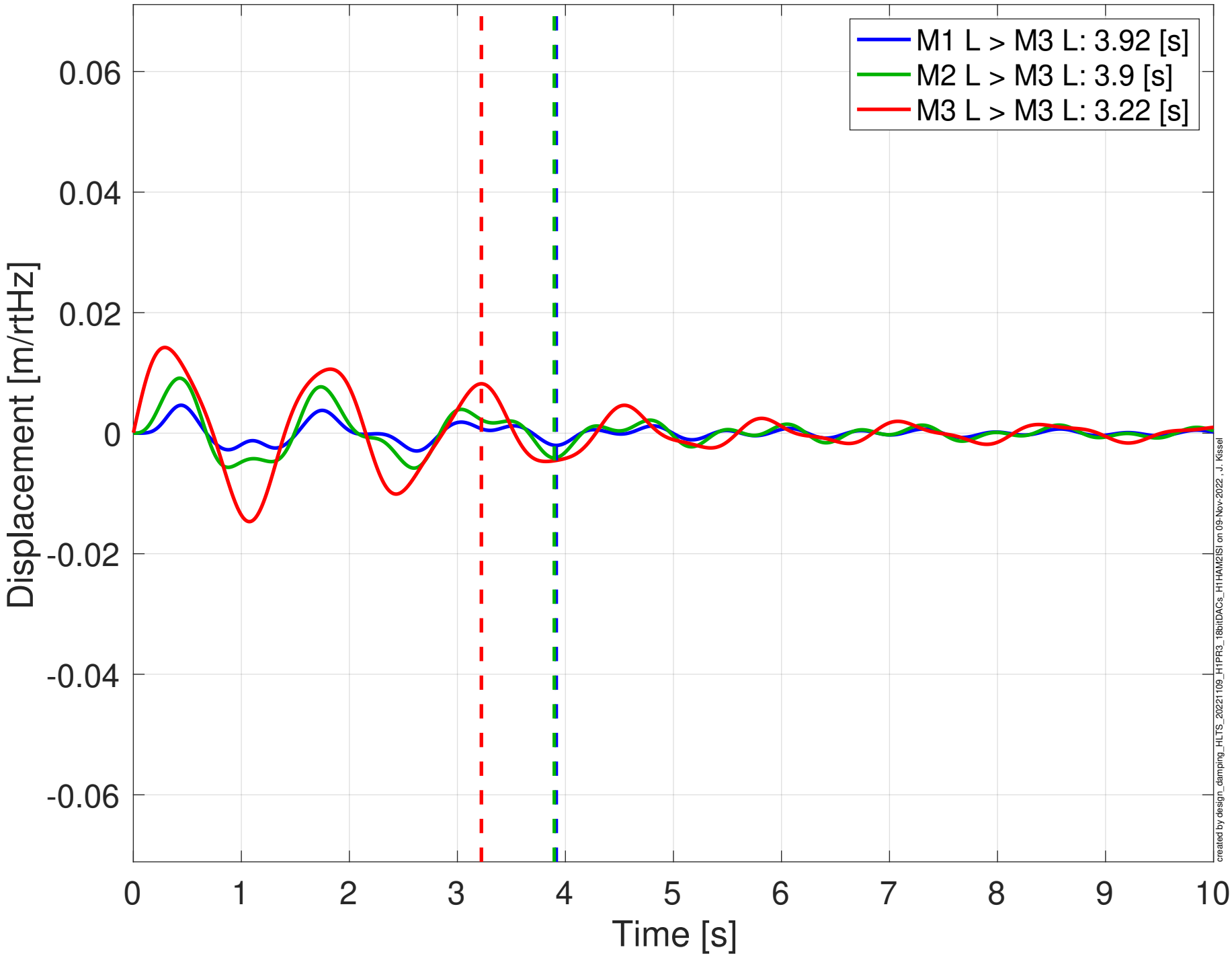
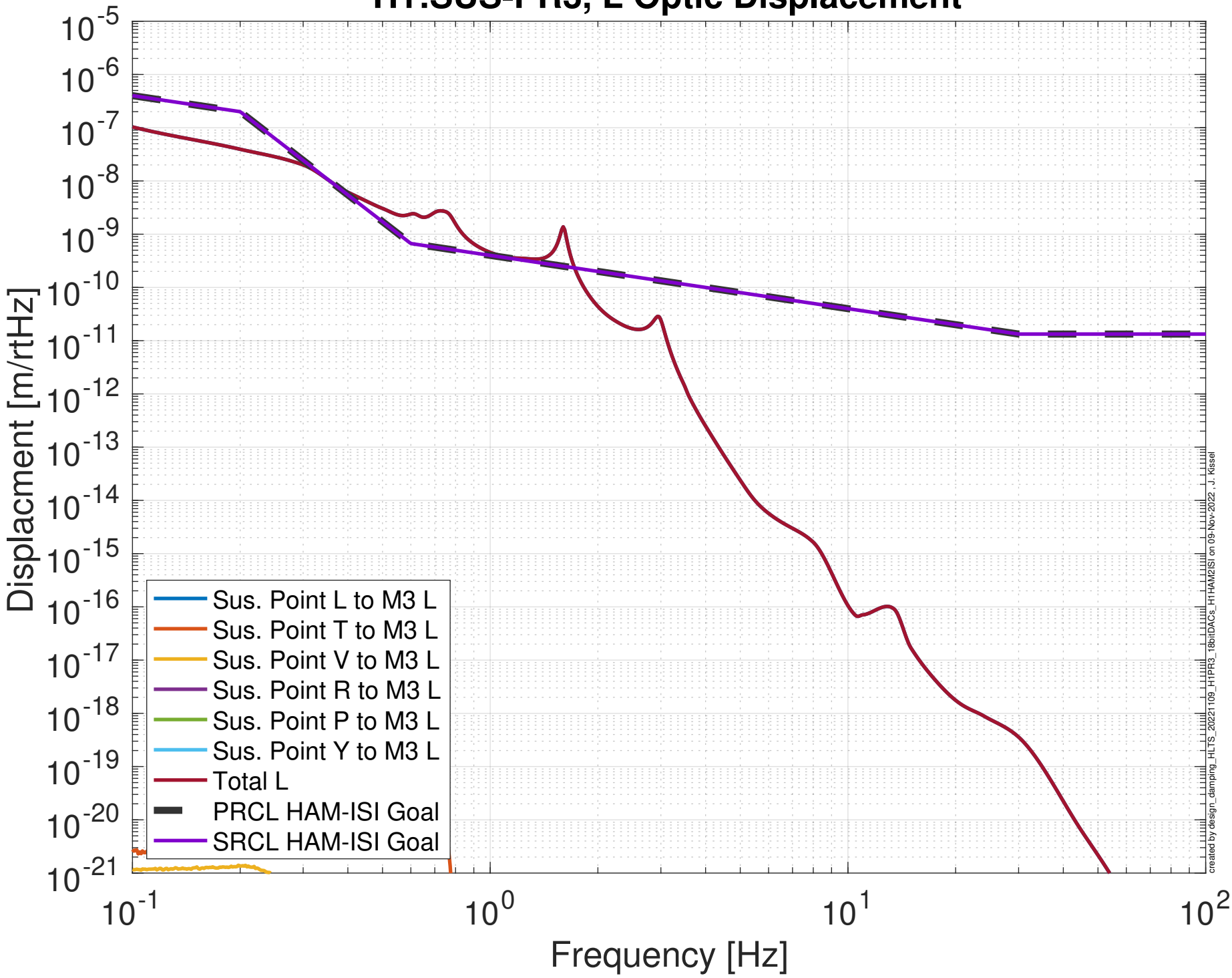

HLTS Damping Loop Performance; Differential Arm Displacement
Assuming SRCL2DARM(ZDET,HiPwr) TF from T080192
L Residual Seismic Noise * SRCL2DARM
L M1 Sensor Noise * SRCL2DARM
L M3 Actuator Noise * SRCL2DARM
V Total * 0.001[m/m] * SRCL2DARM
P Total * 0.001[m/rad] * SRCL2DARM
Y Total * 0.001[m/rad] * SRCL2DARM
L Total * SRCL2DARM
L Requirements * SRCL2DARM
Zero-Detuned, High-Power [T0900288 * L]
DARM, Δ L [m/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

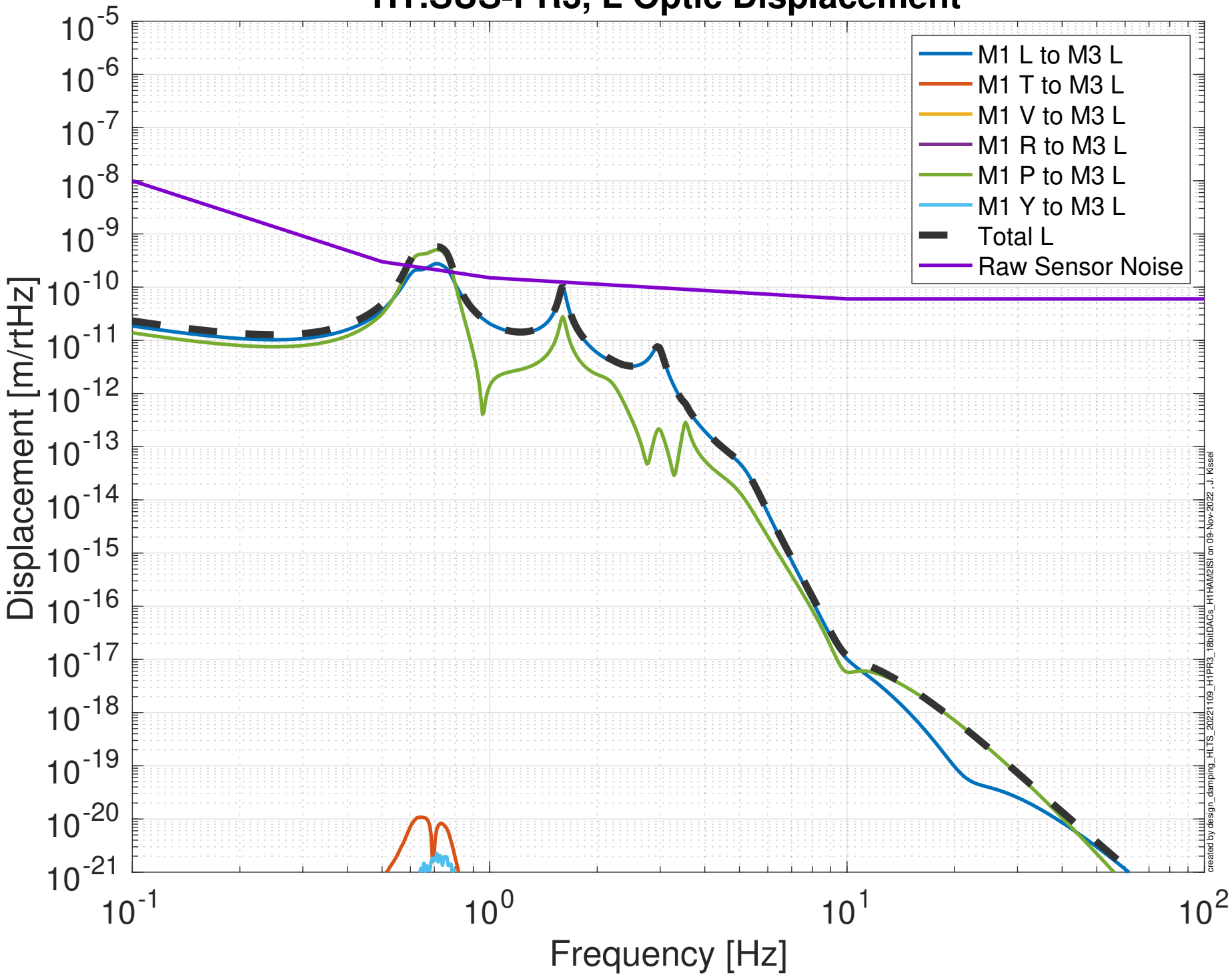

2022-11-09 HLTS, Normalized Damping Filters
Magnitude [(DAC ct)/(ADC ct)]
L
T
V
R
P
Y
Frequency [Hz]
Phase [deg]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

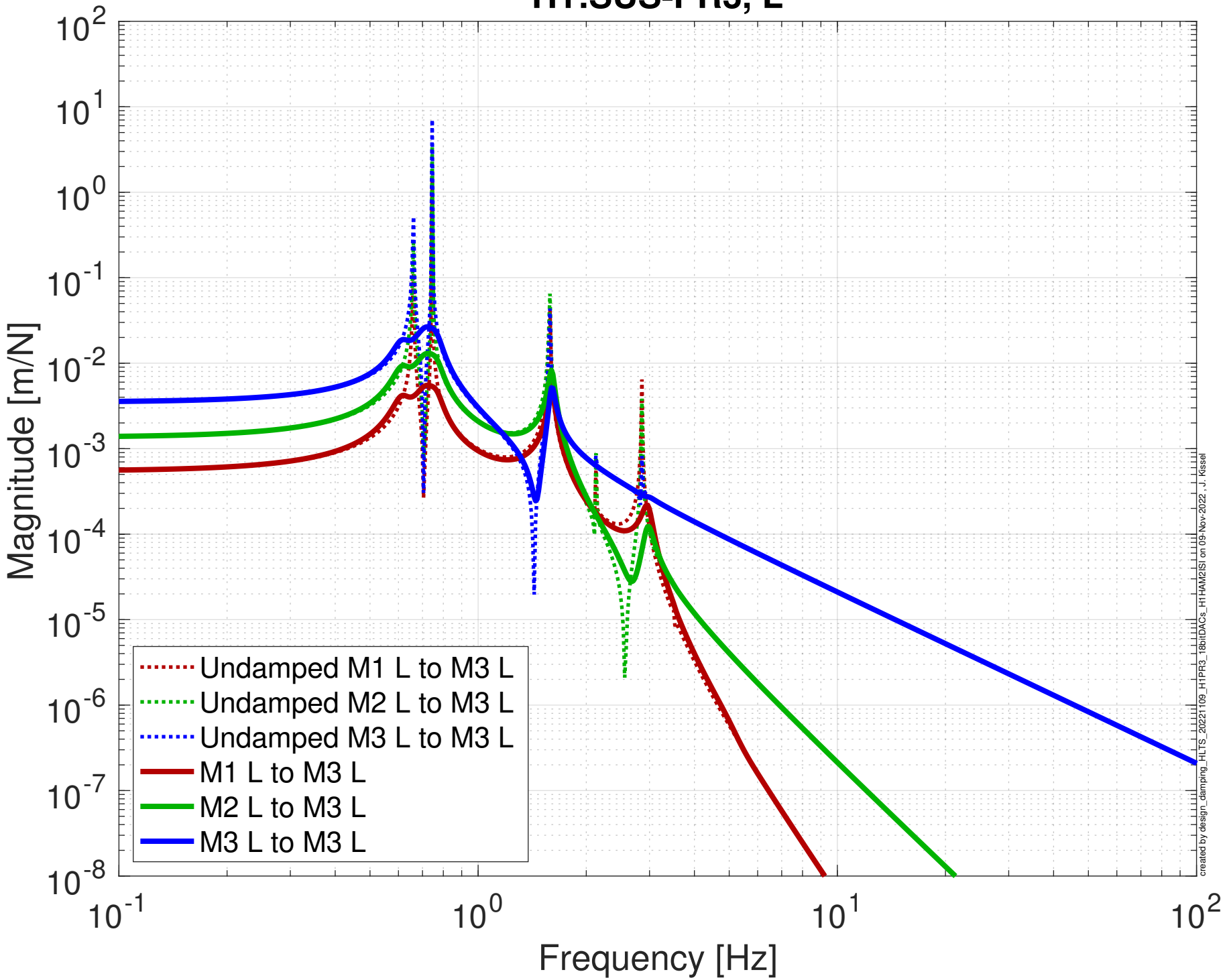

2022-11-09 HLTS, Calibrated Damping Filters
Calibration = 66.01 [(sens ct/m) . (N/drive ct)] or [(sens ct/rad) . (N.m/drive ct)]
Magnitude [see legend]
Frequency [Hz]
Phase [deg]
Frequency [Hz]
L [N/m] (Gain = -1)
T [N/m] (Gain = -1)
V [N/m] (Gain = -1)
R [N.m/rad] (Gain = -1)
P [N.m/rad] (Gain = -1)
Y [N.m/rad] (Gain = -1)
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

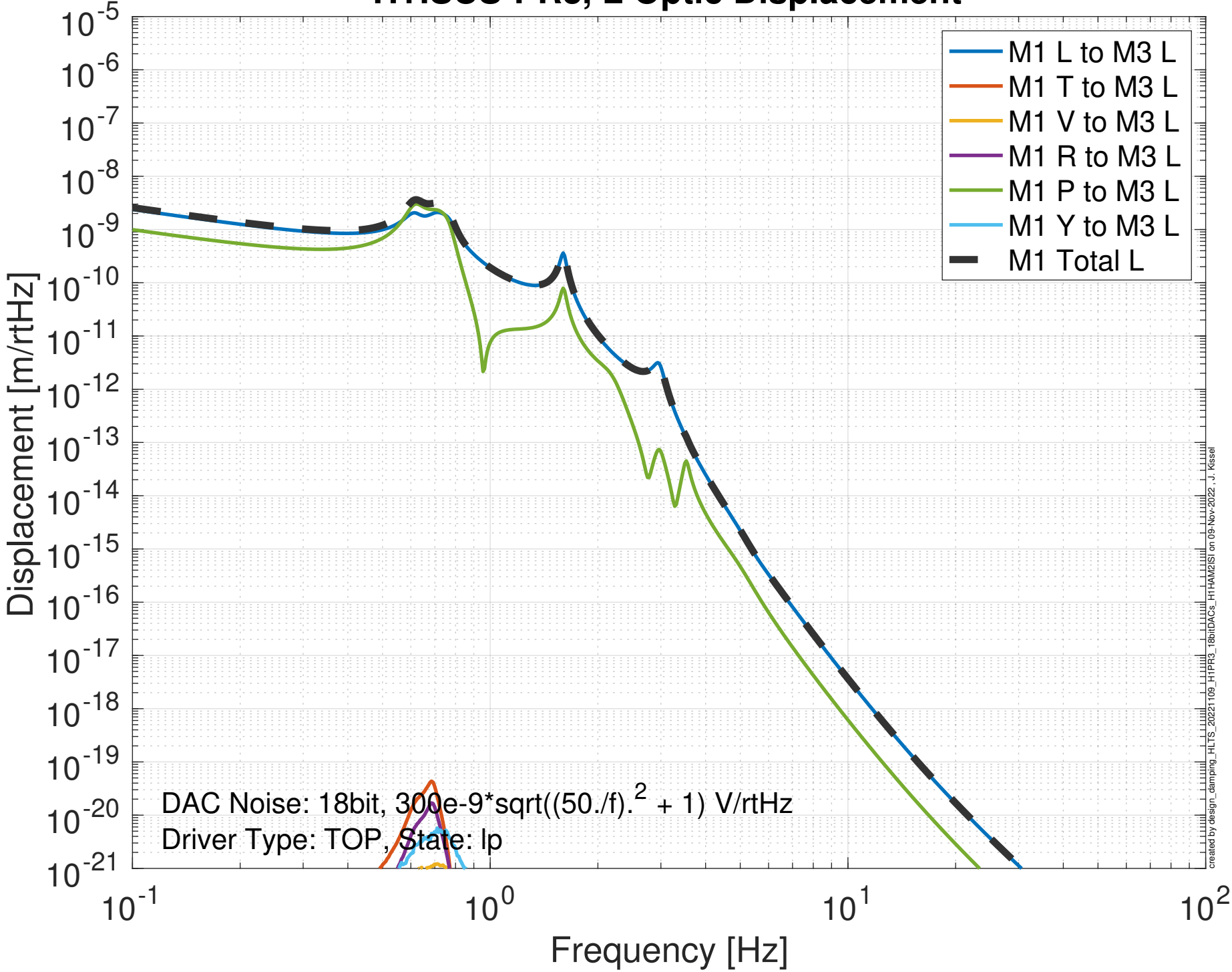

Damping Loop Design
H1:SUS-PR3 L
Magnitude
MIMO LUGF Phase Margins (red): [127 139] [deg]
MIMO UUGF Phase Margins (blue): [57.7 34.8] [deg]
Phase [deg]
Frequency [Hz]
Plant [m/N] / 1
SISO Open Loop
MIMO Open Loop
SISO Suppression
SISO Closed Loop / 1
MIMO Closed Loop / 1
Control [N/m] / 100
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

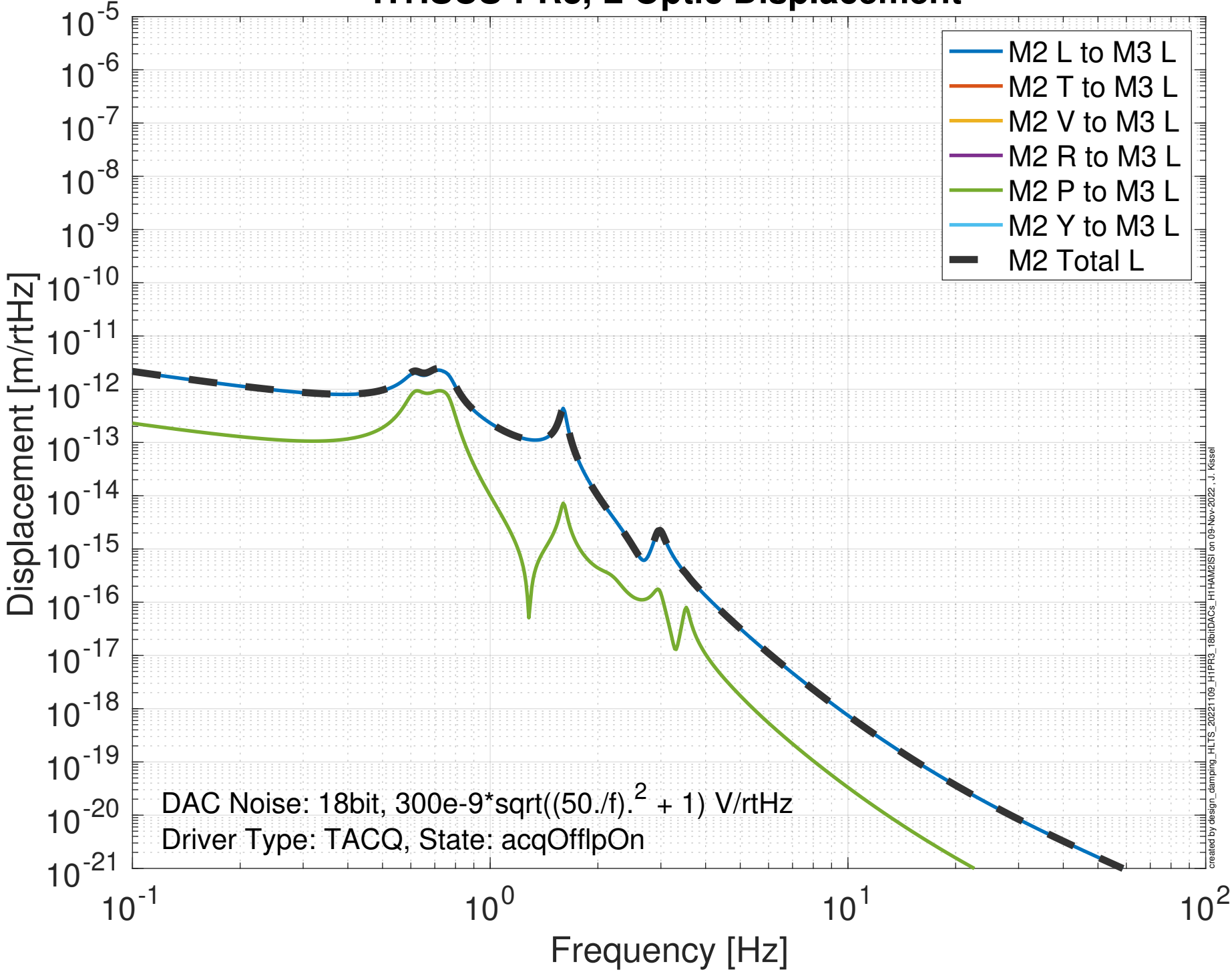

Damped Impulse Response
H1:SUS-PR3 L
M1 L > M3 L: 3.92 [s]
M2 L > M3 L: 3.9 [s]
M3 L > M3 L: 3.22 [s]
Displacement [m/rtHz]
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
0
1
2
3
4
5
6
7
8
9
10
Time [s]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

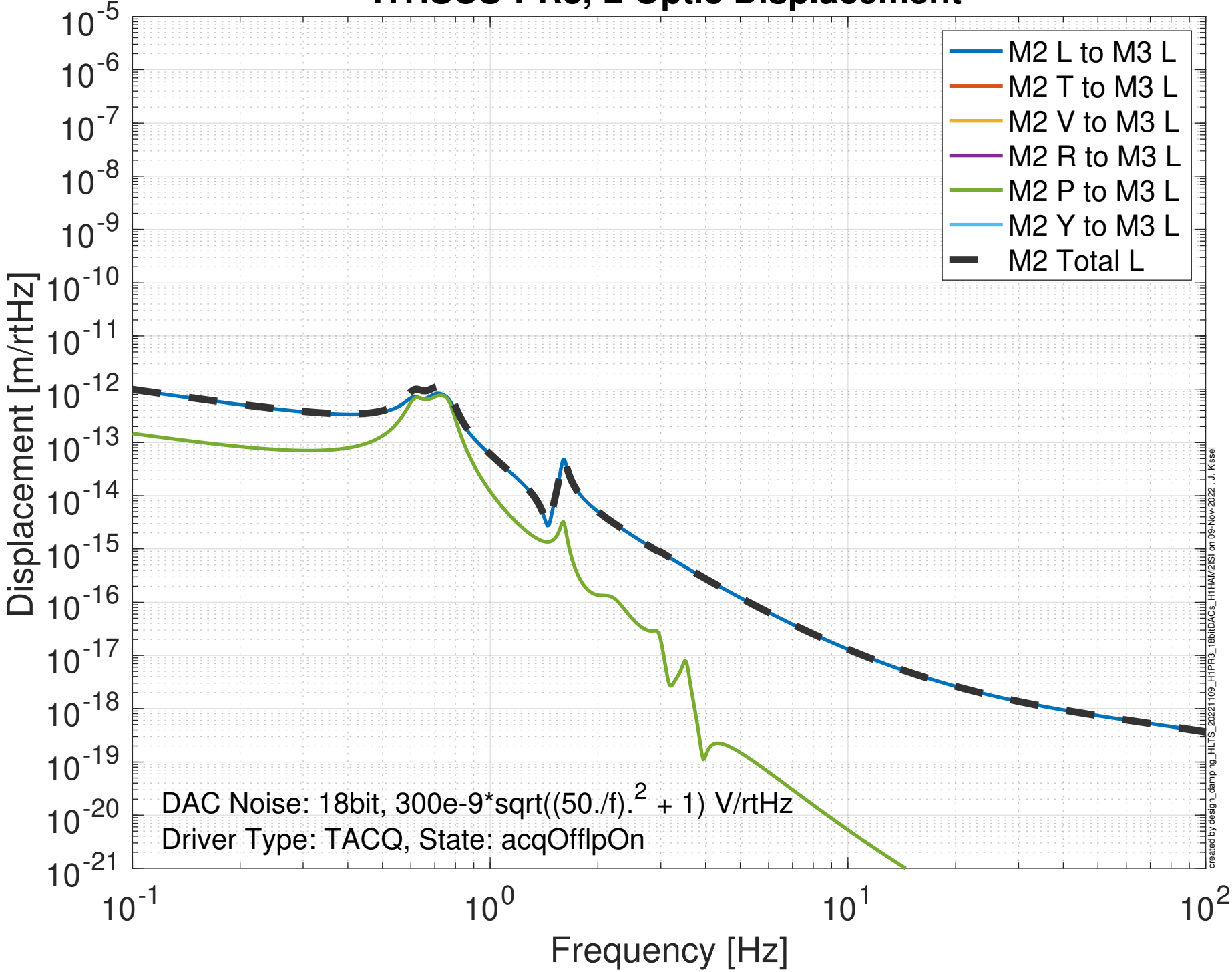

Projected Sus. Point > Optic Seismic Noise Budget
H1:SUS-PR3, L Optic Displacement
Displacment [m/rtHz]
Frequency [Hz]
Sus. Point L to M3 L
Sus. Point T to M3 L
Sus. Point V to M3 L
Sus. Point R to M3 L
Sus. Point P to M3 L
Sus. Point Y to M3 L
Total L
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Projected Top Mass Sensor > Optic Noise Budget
H1:SUS-PR3, L Optic Displacement
M1 L to M3 L
M1 T to M3 L
M1 V to M3 L
M1 R to M3 L
M1 P to M3 L
M1 Y to M3 L
Total L
Raw Sensor Noise
Displacement [m/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

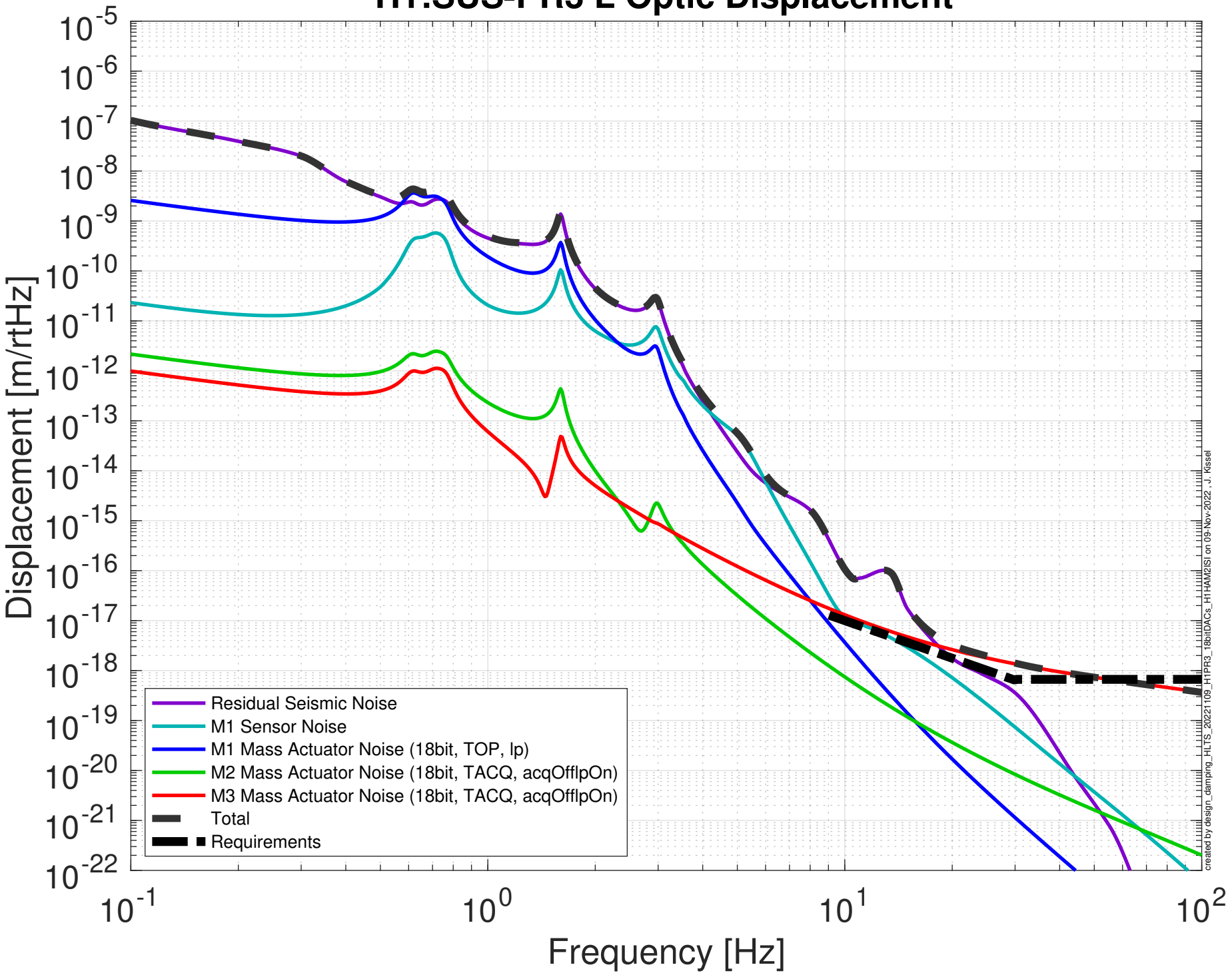

Global Control Transfer Functions to Optic
H1:SUS-PR3, L
Magnitude [m/N]
Frequency [Hz]
Undamped M1 L to M3 L
Undamped M2 L to M3 L
Undamped M3 L to M3 L
M1 L to M3 L
M2 L to M3 L
M3 L to M3 L
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

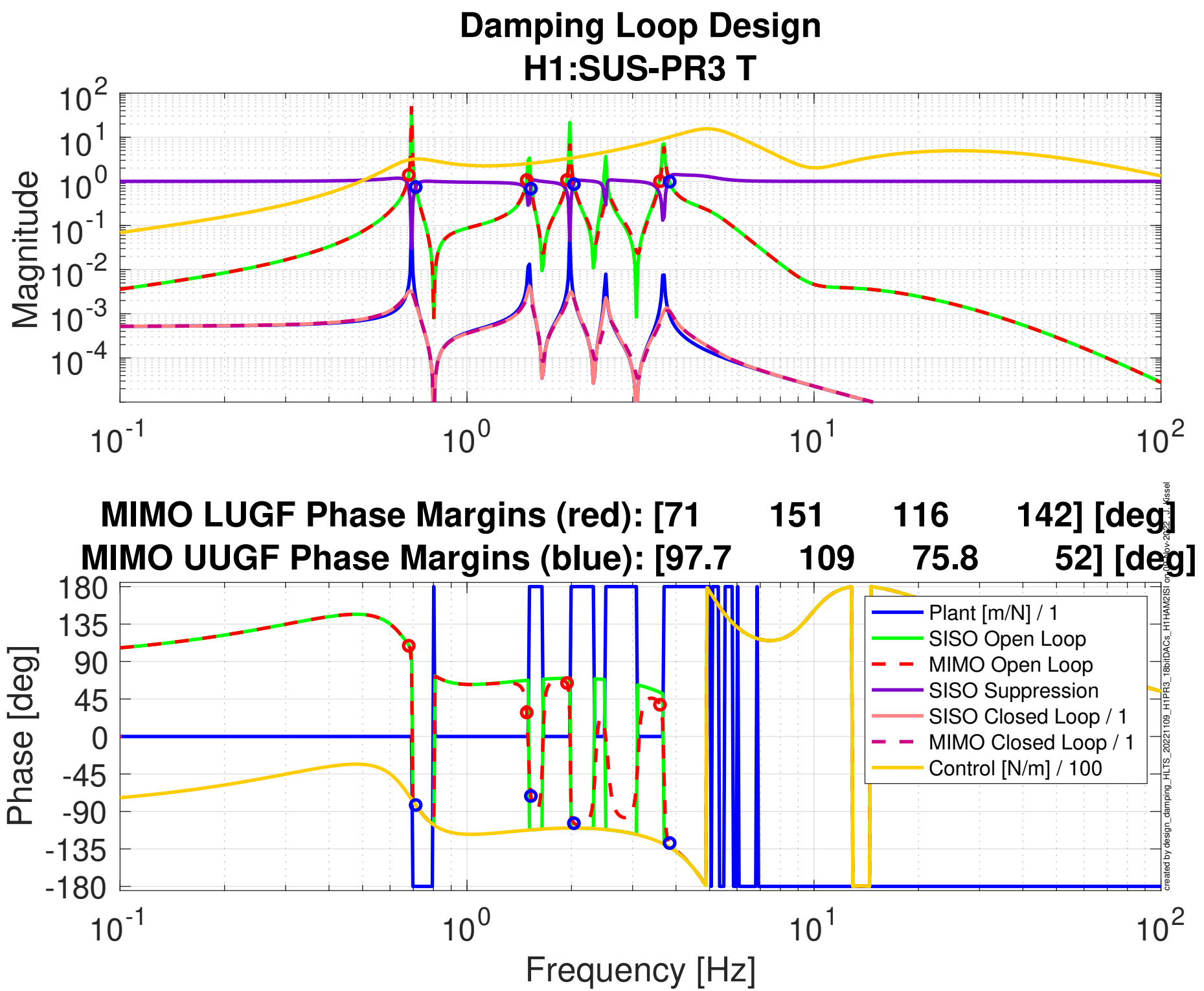

Projected M1 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, L Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
M1 L to M3 L
M1 T to M3 L
M1 V to M3 L
M1 R to M3 L
M1 P to M3 L
M1 Y to M3 L
M1 Total L
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TOP, State: lp
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

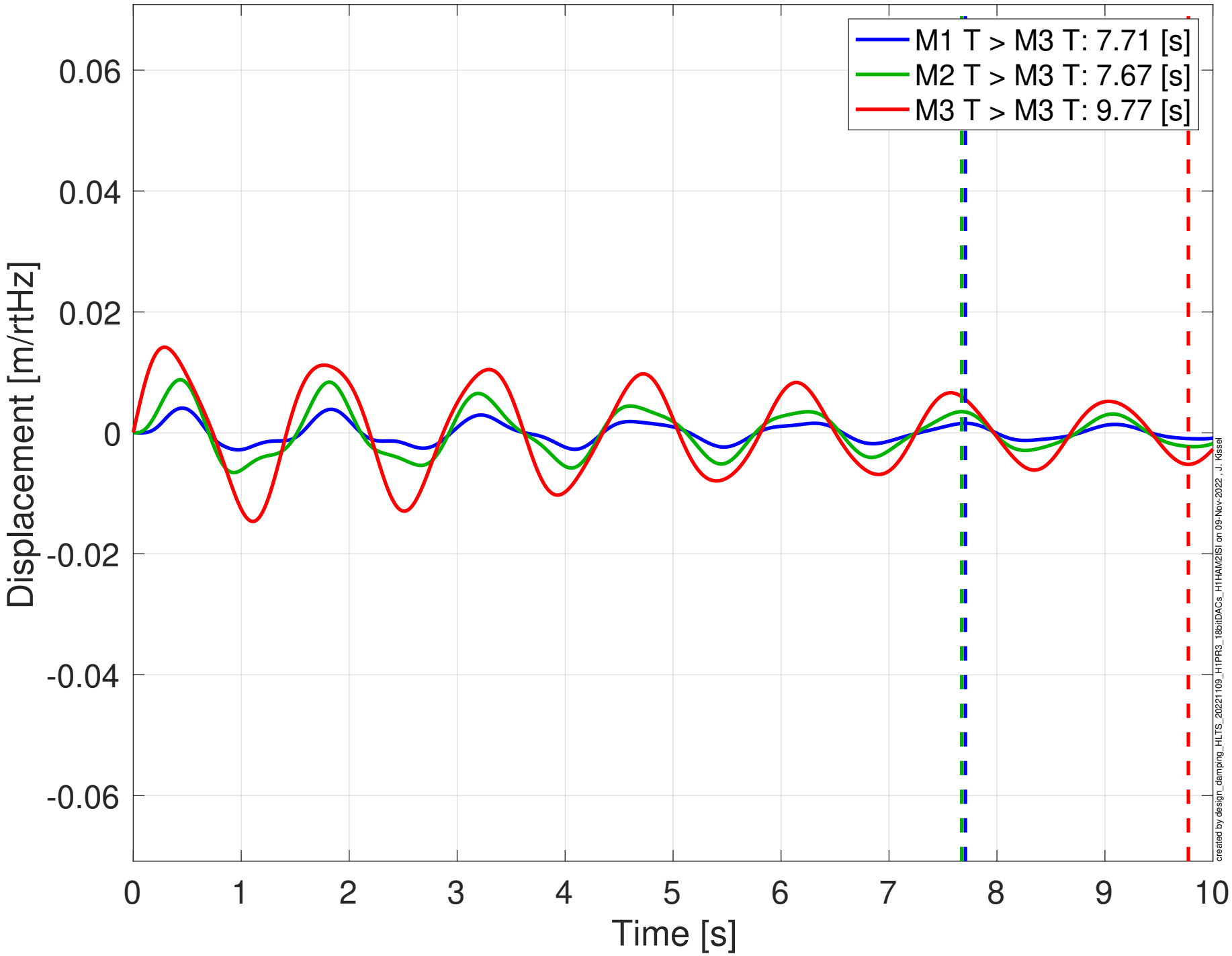

Projected M2 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, L Optic Displacement
M2 L to M3 L
M2 T to M3 L
M2 V to M3 L
M2 R to M3 L
M2 P to M3 L
M2 Y to M3 L
M2 Total L
Displacement [m/rtHz]
Frequency [Hz]
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TACQ, State: acqOfflpOn
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

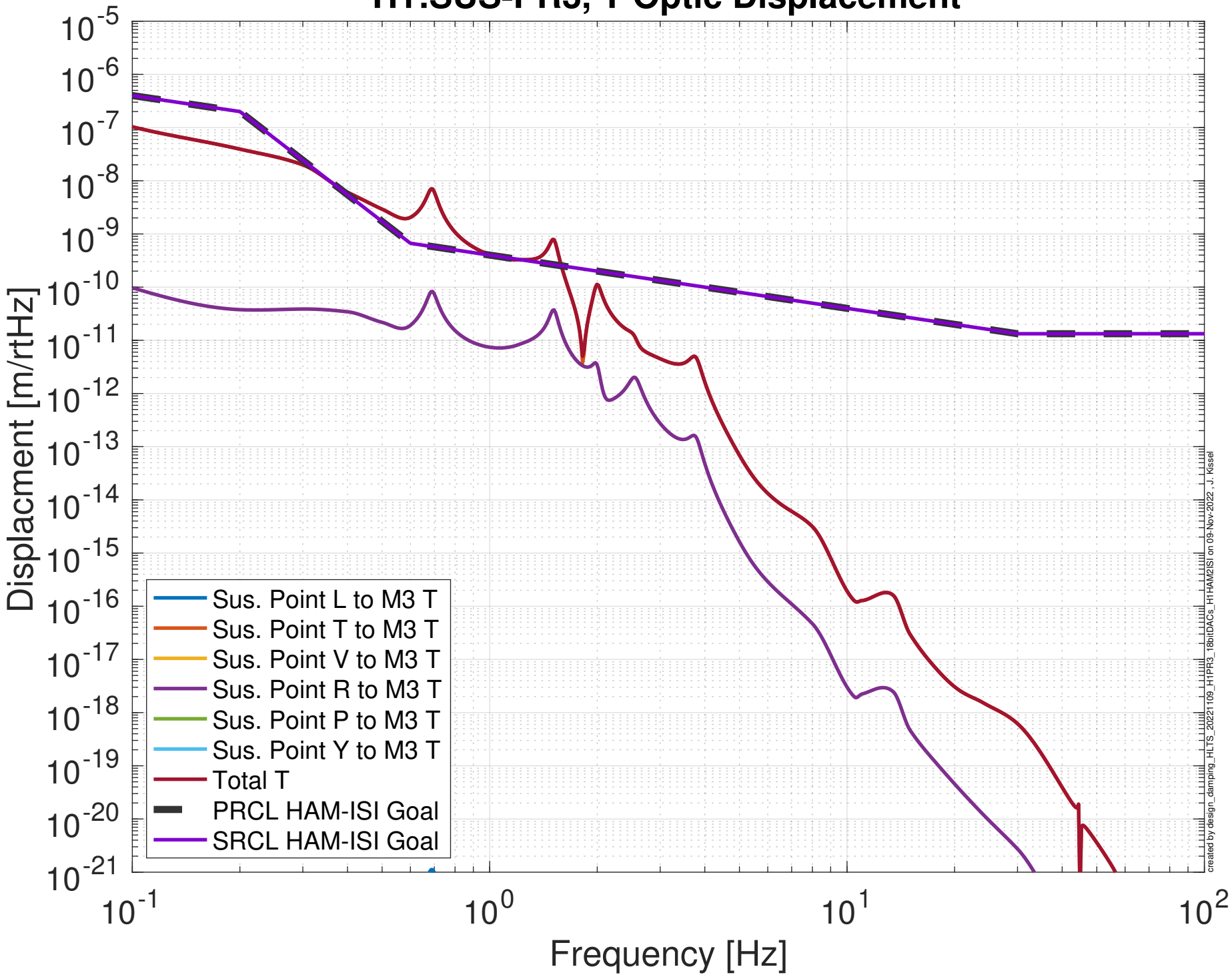

Projected M3 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, L Optic Displacement
M2 L to M3 L
M2 T to M3 L
M2 V to M3 L
M2 R to M3 L
M2 P to M3 L
M2 Y to M3 L
M2 Total L
Displacement [m/rtHz]
Frequency [Hz]
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TACQ, State: acqOfflpOn
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

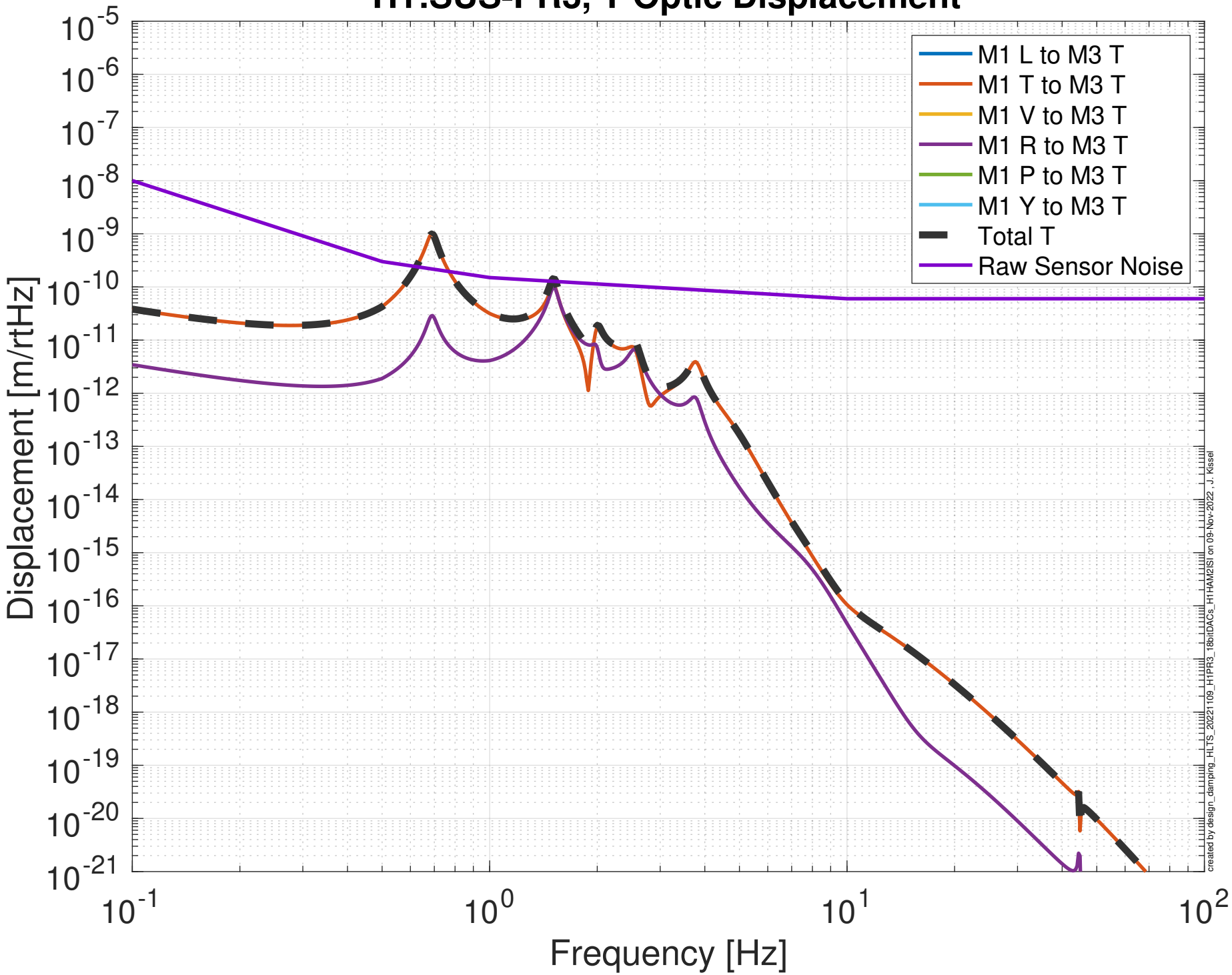
Damping Loop Performance
H1:SUS-PR3 L Optic Displacement

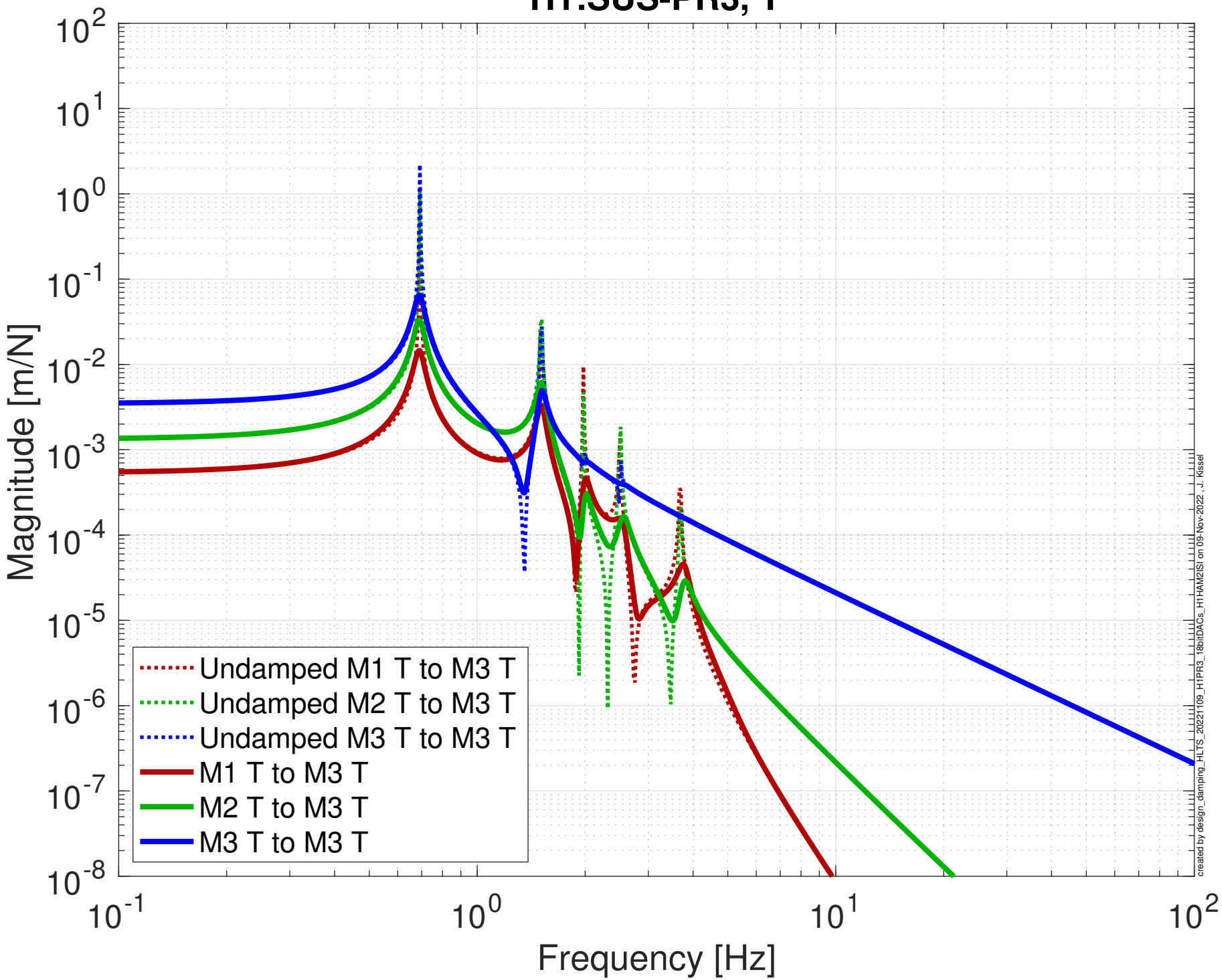


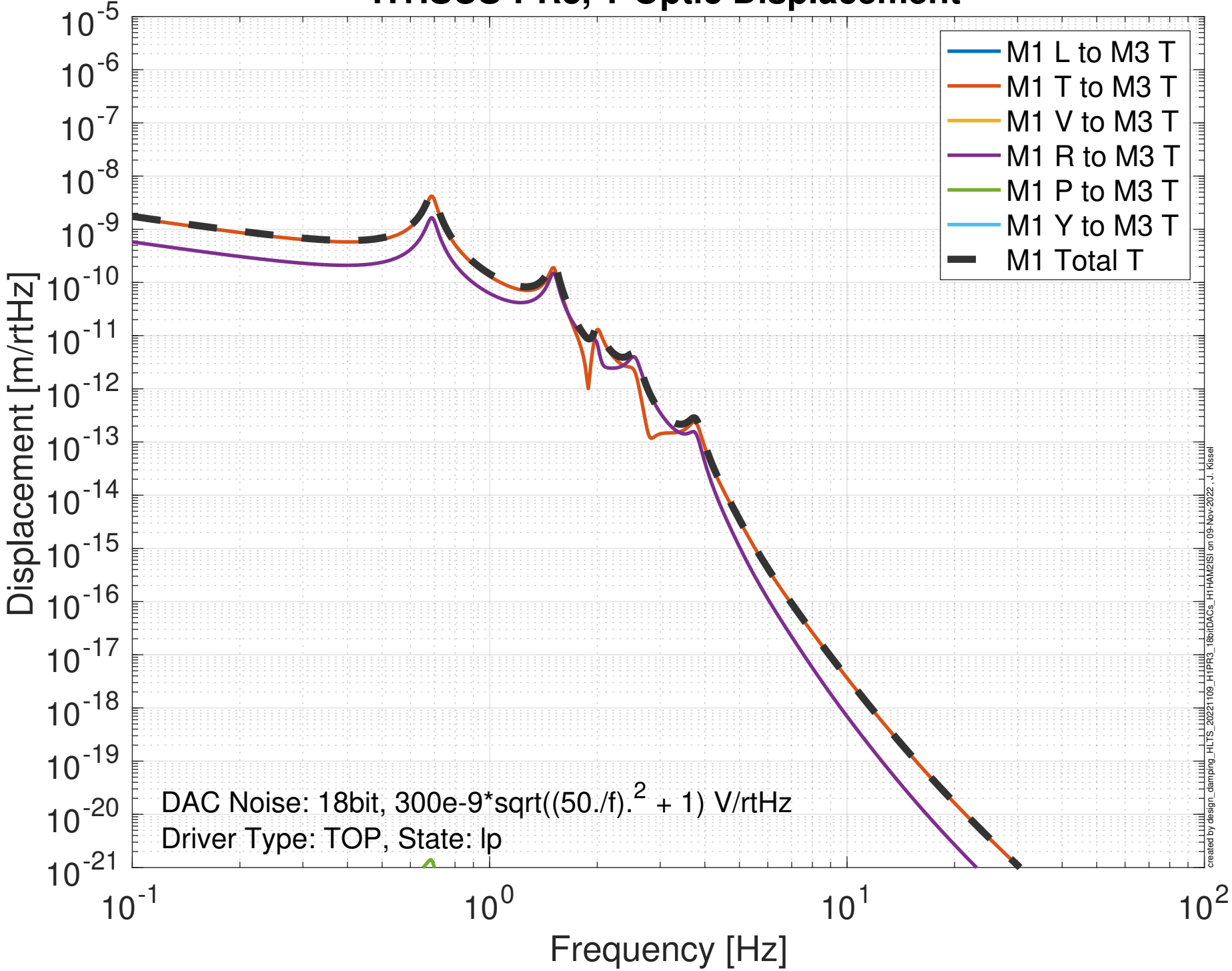

Damping Loop Design
H1:SUS-PR3 T
Magnitude
MIMO LUGF Phase Margins (red): [71 151 116 142] [deg]
MIMO UUGF Phase Margins (blue): [97.7 109 75.8 52] [deg]
Phase [deg]
Frequency [Hz]
Plant [m/N] / 1
SISO Open Loop
MIMO Open Loop
SISO Suppression
SISO Closed Loop / 1
MIMO Closed Loop / 1
Control [N/m] / 100
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 by Kissel


Damped Impulse Response
H1:SUS-PR3 T
M1 T > M3 T: 7.71 [s]
M2 T > M3 T: 7.67 [s]
M3 T > M3 T: 9.77 [s]
Displacement [m/rtHz]
0.06
0.04
0.02
0
-0.02
-0.04
-0.06
0
1
2
3
4
5
6
7
8
9
10
Time [s]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

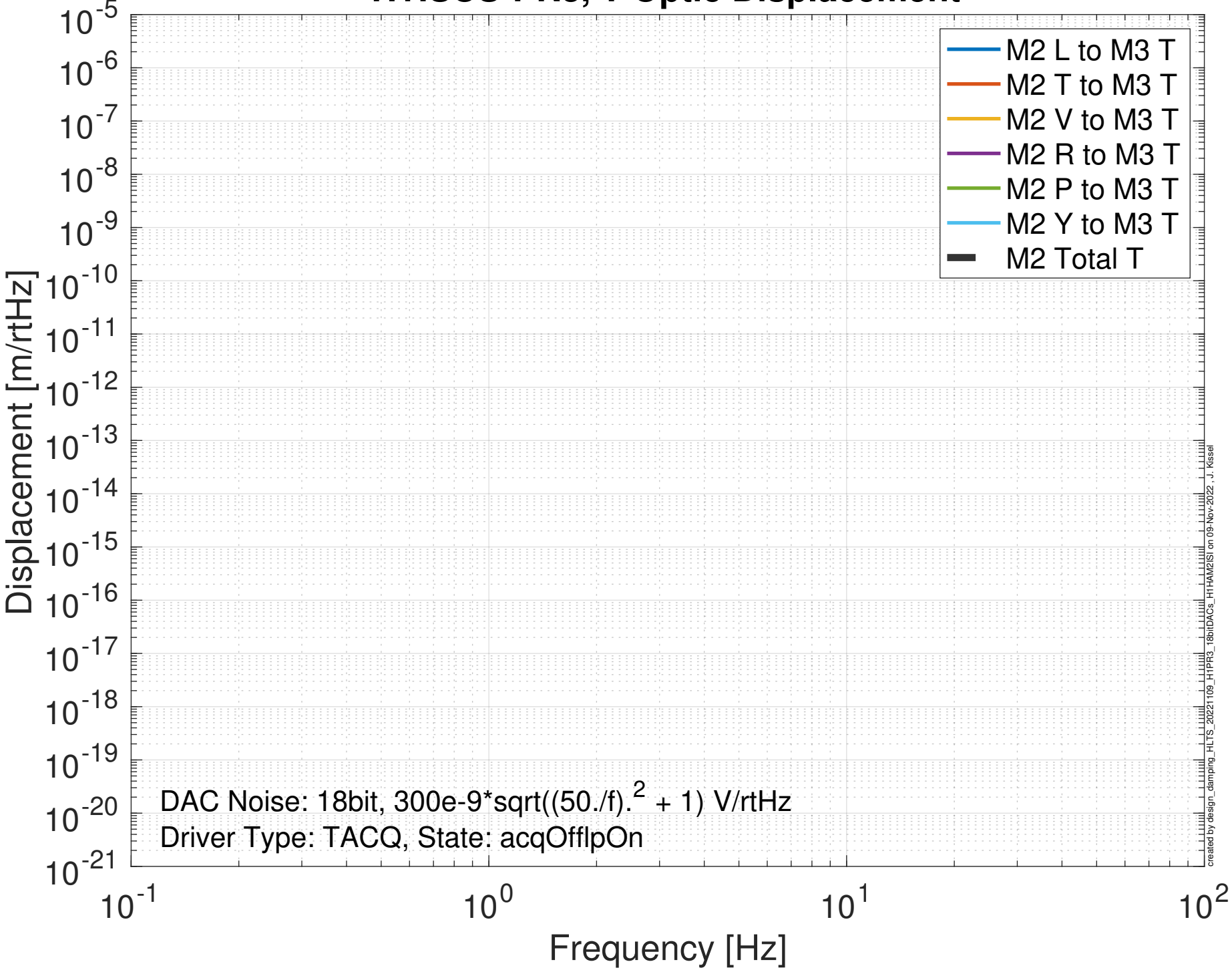

Projected Sus. Point > Optic Seismic Noise Budget
H1:SUS-PR3, T Optic Displacement
Displacment [m/rtHz]
Frequency [Hz]
Sus. Point L to M3 T
Sus. Point T to M3 T
Sus. Point V to M3 T
Sus. Point R to M3 T
Sus. Point P to M3 T
Sus. Point Y to M3 T
Total T
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Projected Top Mass Sensor > Optic Noise Budget
H1:SUS-PR3, T Optic Displacement
M1 L to M3 T
M1 T to M3 T
M1 V to M3 T
M1 R to M3 T
M1 P to M3 T
M1 Y to M3 T
Total T
Raw Sensor Noise
Displacement [m/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

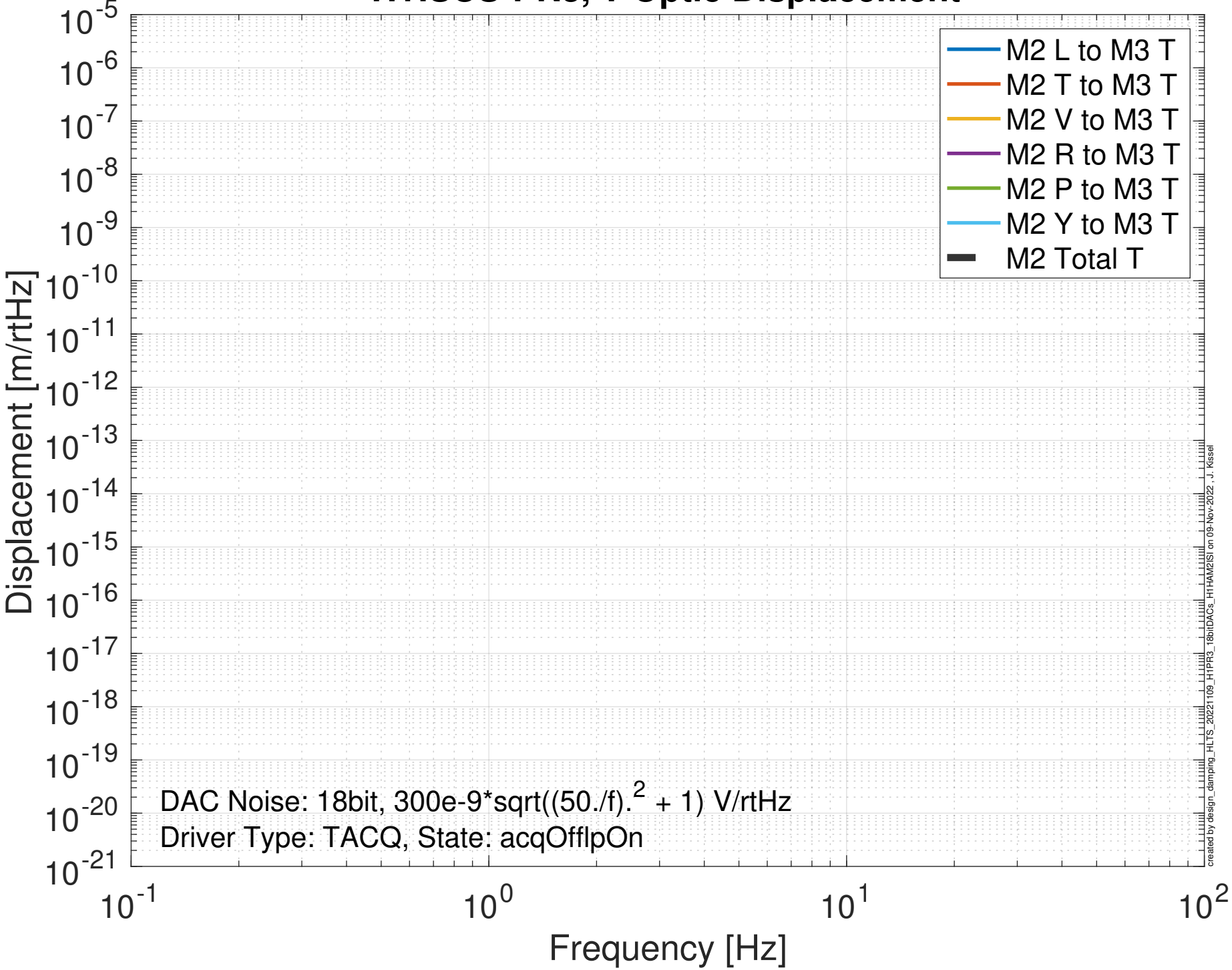

Global Control Transfer Functions to Optic
H1:SUS-PR3, T
Magnitude [m/N]
Frequency [Hz]
Undamped M1 T to M3 T
Undamped M2 T to M3 T
Undamped M3 T to M3 T
M1 T to M3 T
M2 T to M3 T
M3 T to M3 T
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Projected M1 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, T Optic Displacement
M1 L to M3 T
M1 T to M3 T
M1 V to M3 T
M1 R to M3 T
M1 P to M3 T
M1 Y to M3 T
M1 Total T
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TOP, State: lp
Displacement [m/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

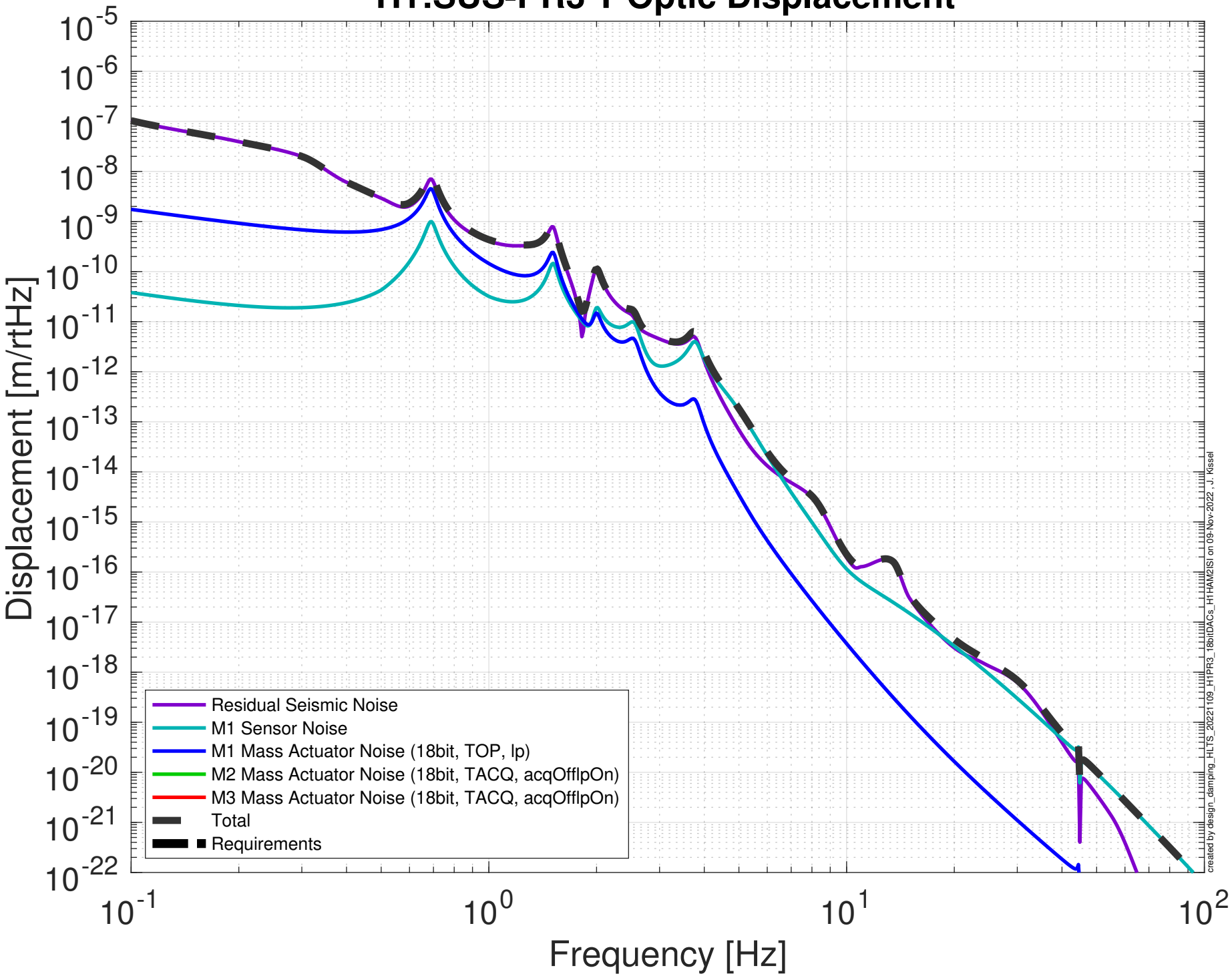
Projected M2 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, T Optic Displacement



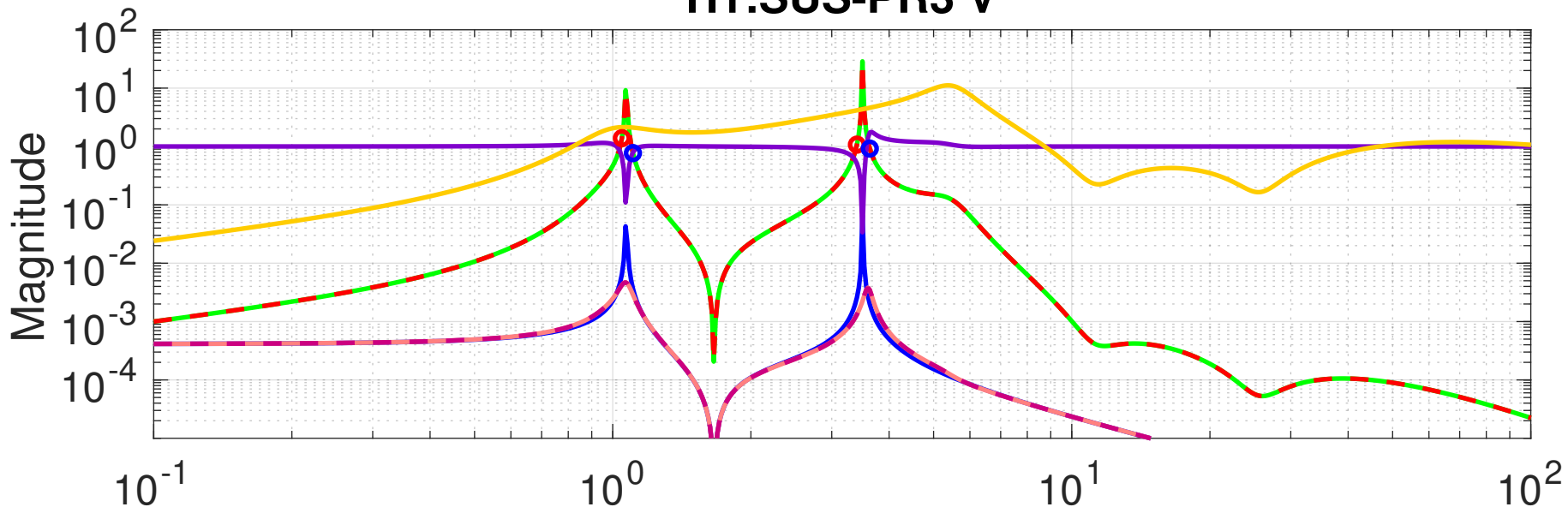
Projected M3 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, T Optic Displacement



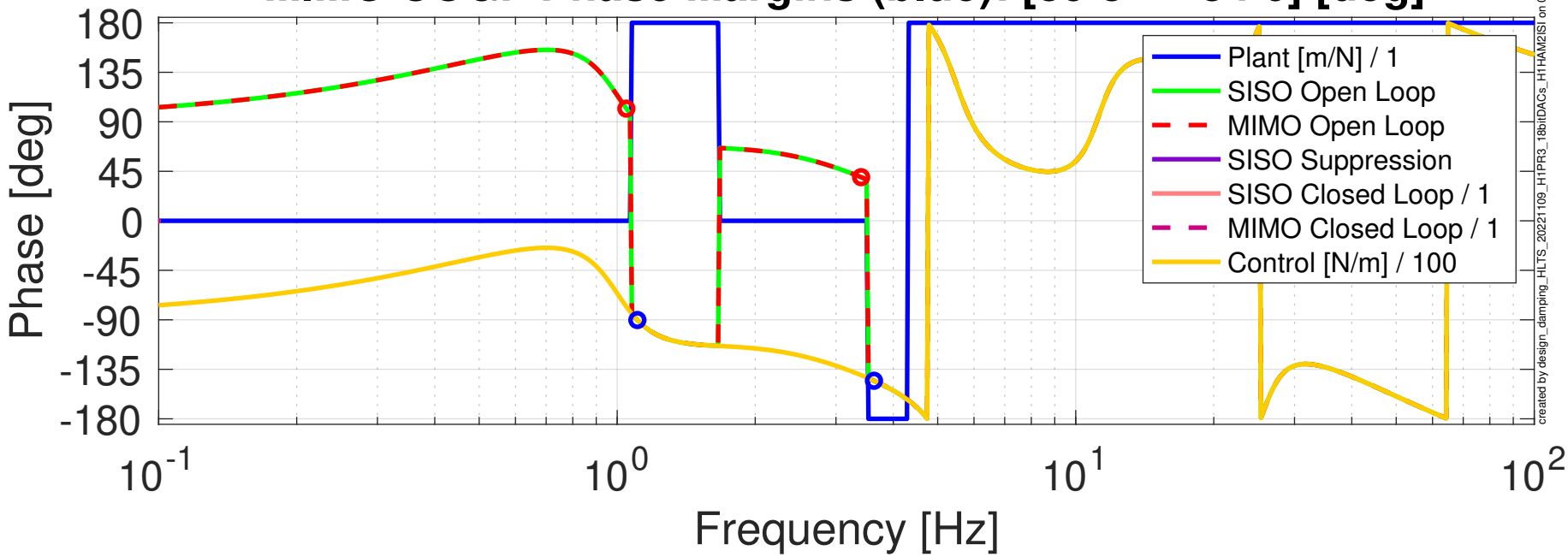
Damping Loop Performance
H1:SUS-PR3 T Optic Displacement

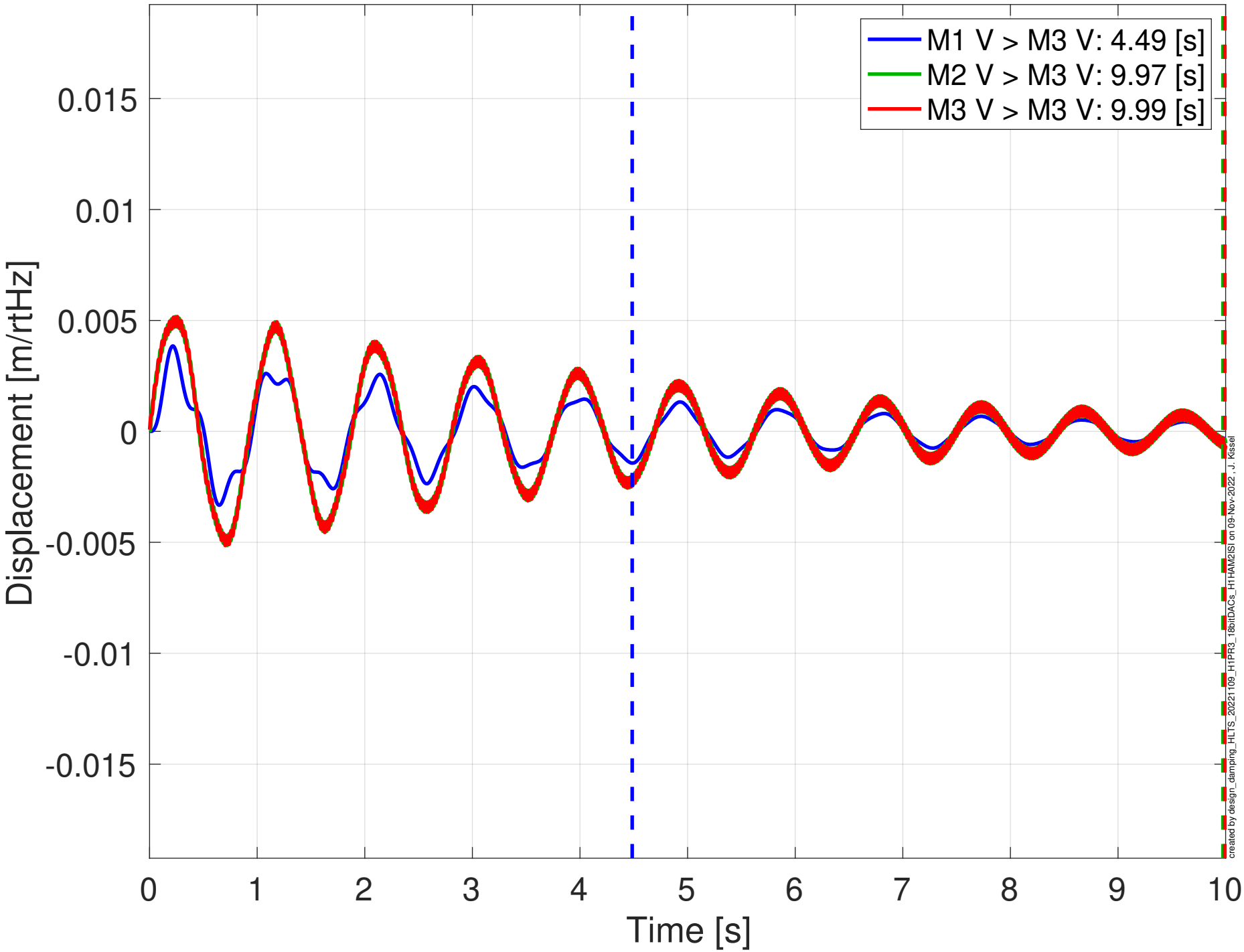


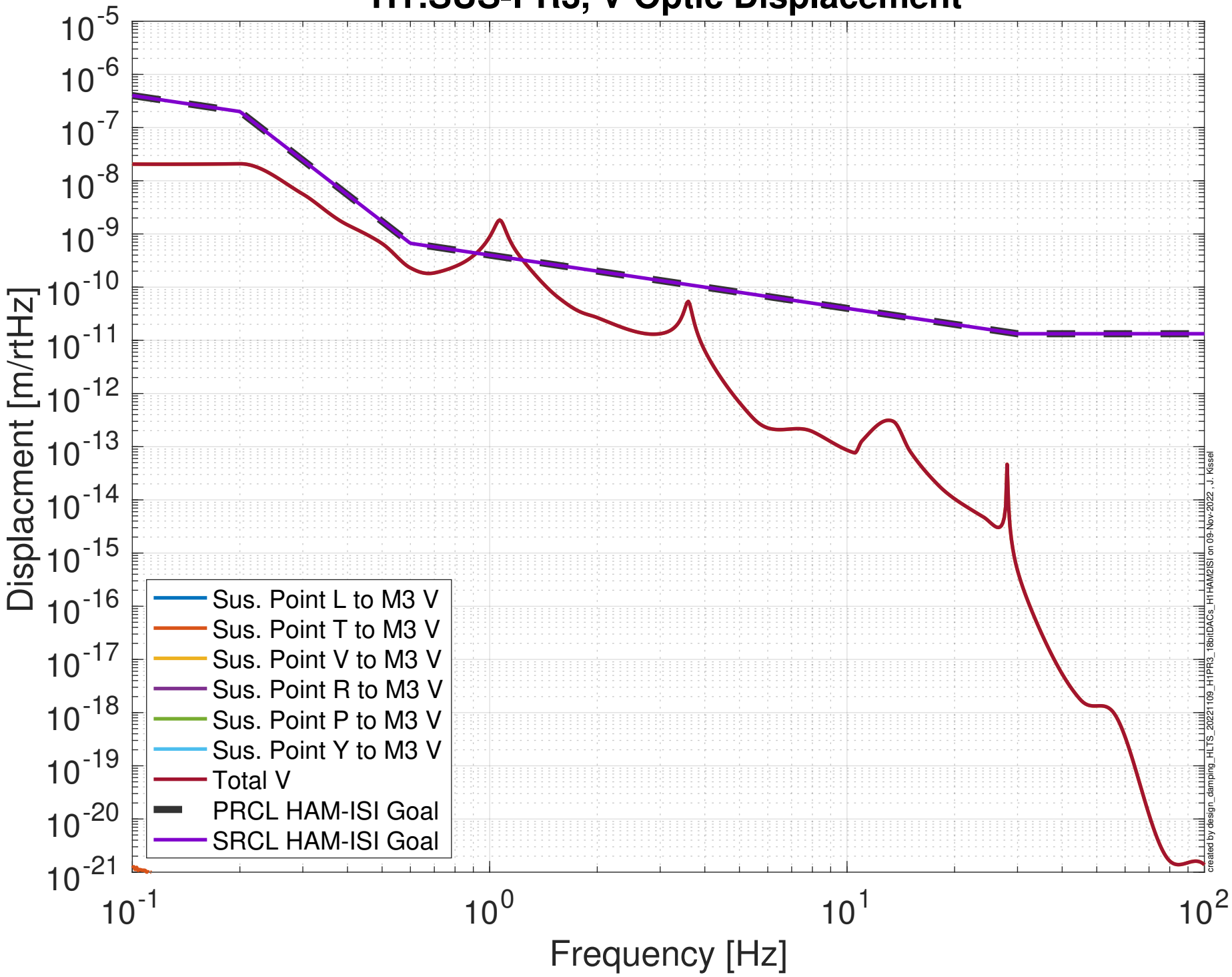
Damping Loop Design
H1:SUS-PR3 V

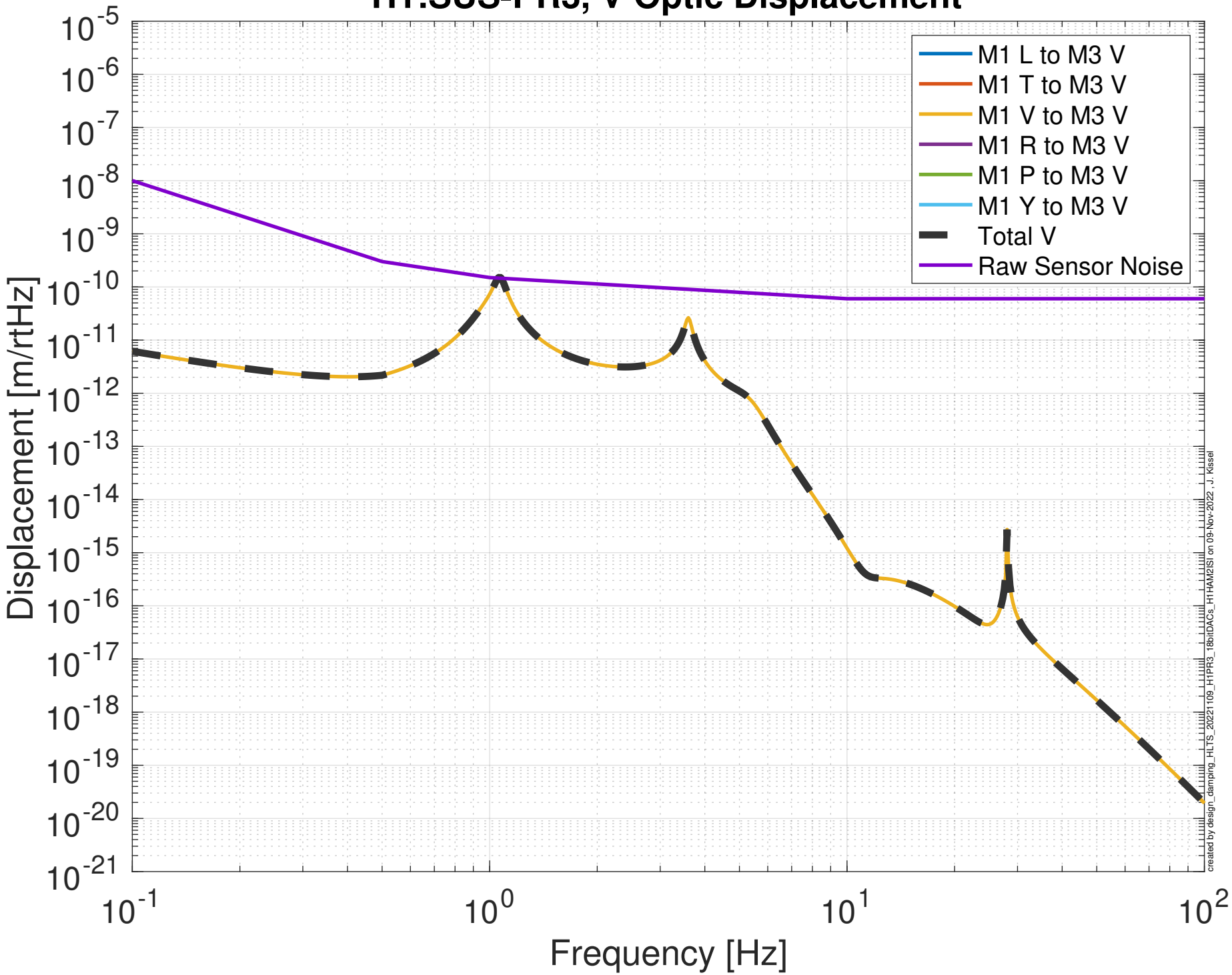


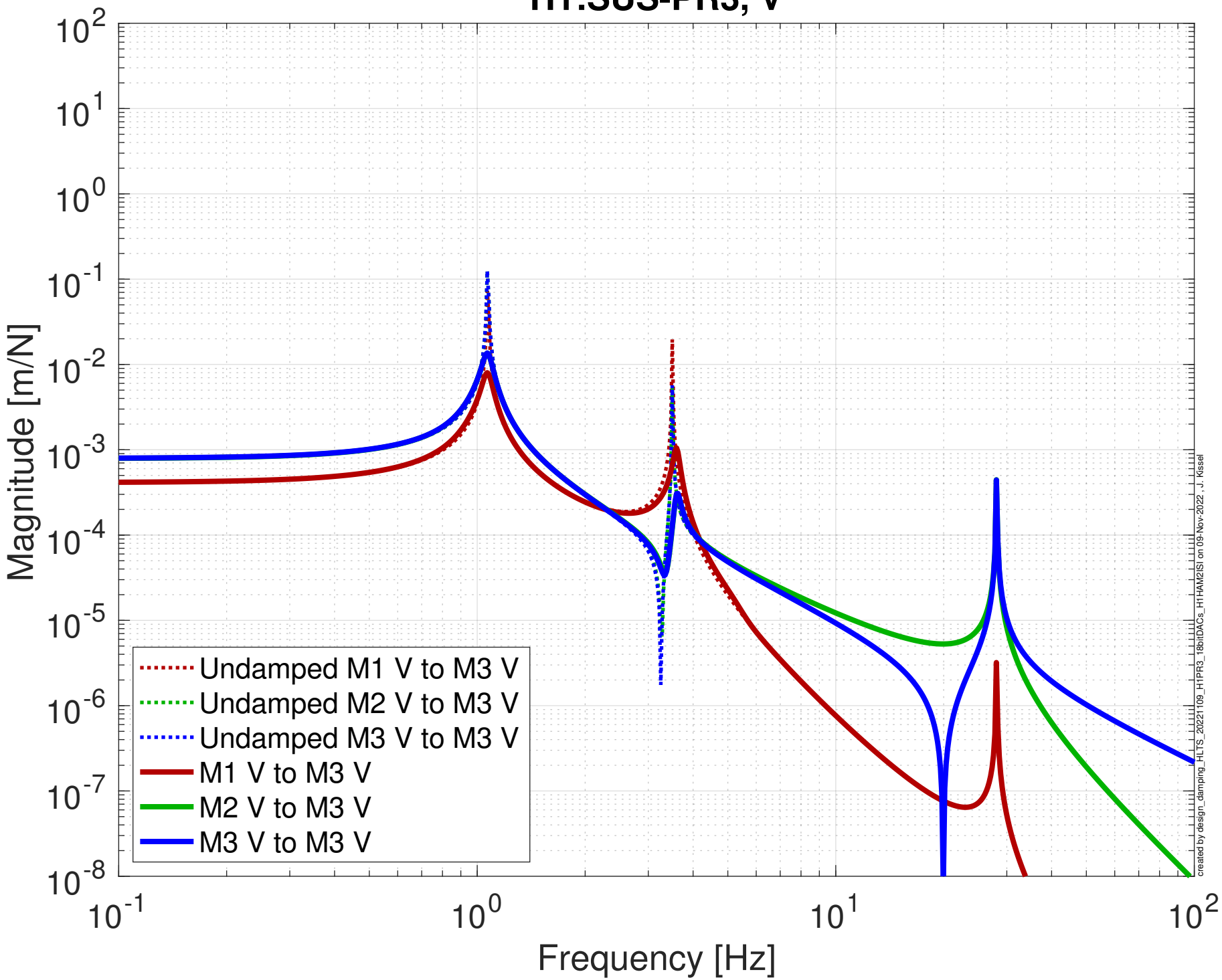
MIMO LUGF Phase Margins (red): [78 140] [deg]
MIMO UUGF Phase Margins (blue): [89.8 34.6] [deg]

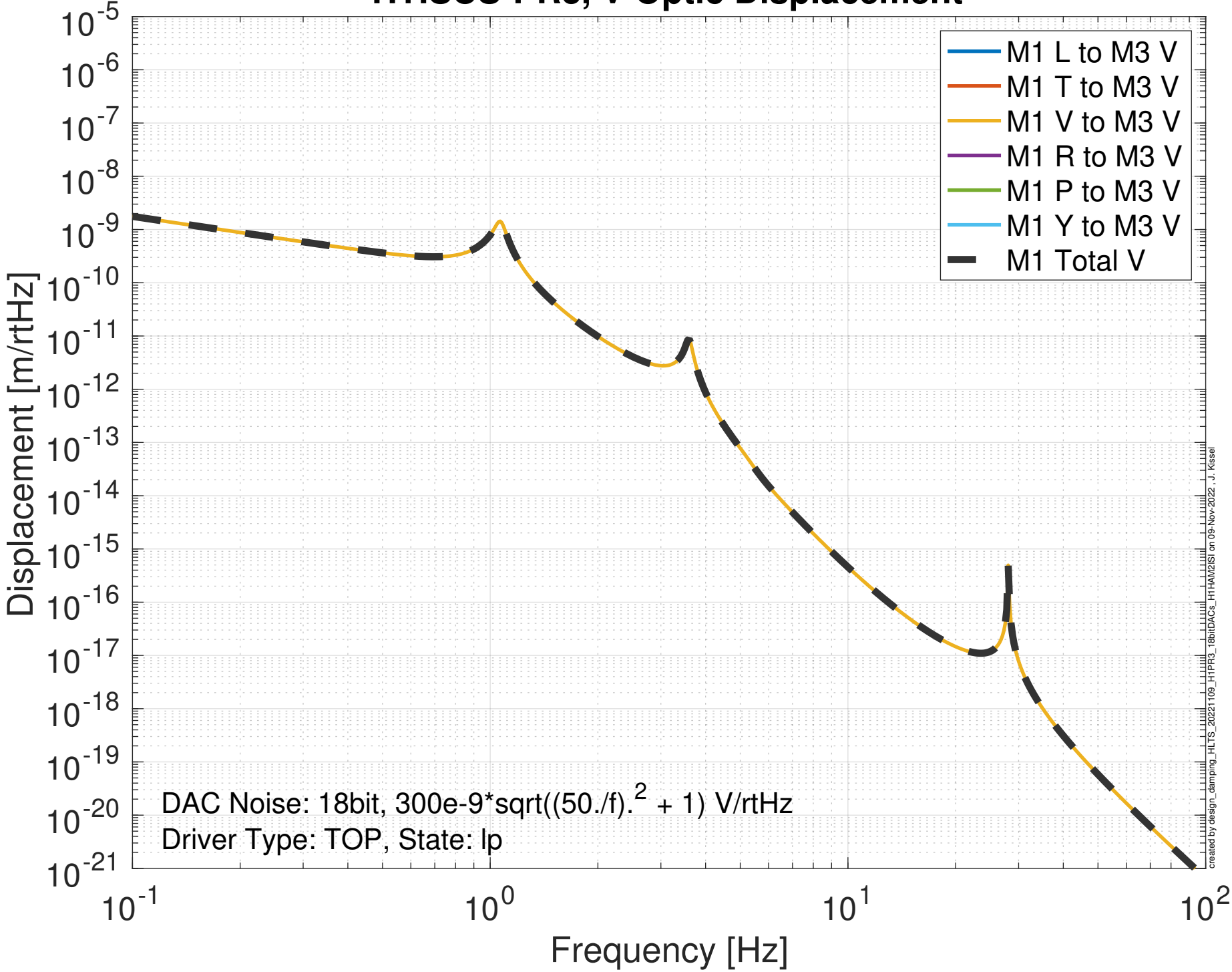



Damped Impulse Response
H1:SUS-PR3 V
M1 V > M3 V: 4.49 [s]
M2 V > M3 V: 9.97 [s]
M3 V > M3 V: 9.99 [s]
Displacement [m/rtHz]
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
0
1
2
3
4
5
6
7
8
9
10
Time [s]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

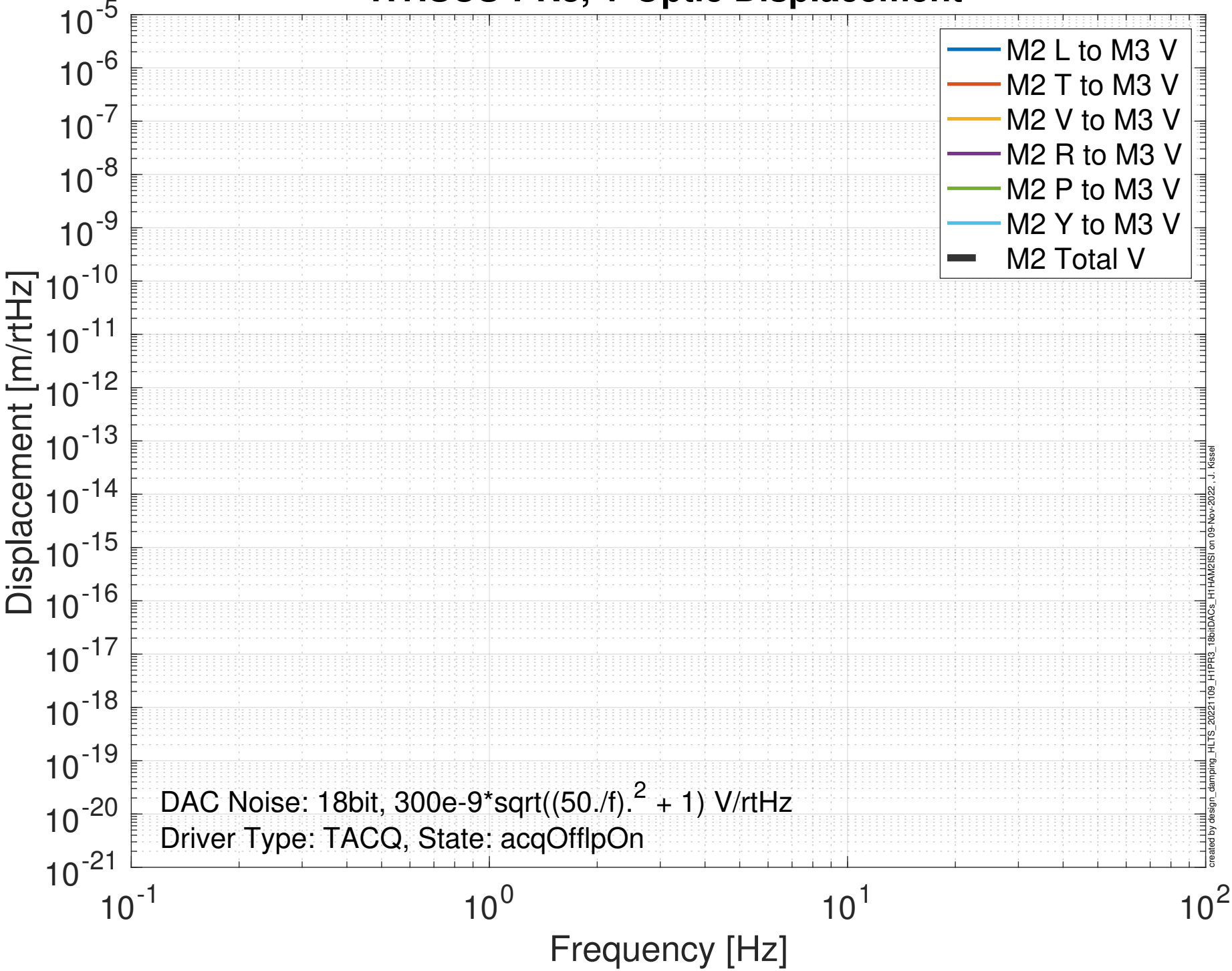

Projected Sus. Point > Optic Seismic Noise Budget
H1:SUS-PR3, V Optic Displacement
Displacment [m/rtHz]
Frequency [Hz]
Sus. Point L to M3 V
Sus. Point T to M3 V
Sus. Point V to M3 V
Sus. Point R to M3 V
Sus. Point P to M3 V
Sus. Point Y to M3 V
Total V
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

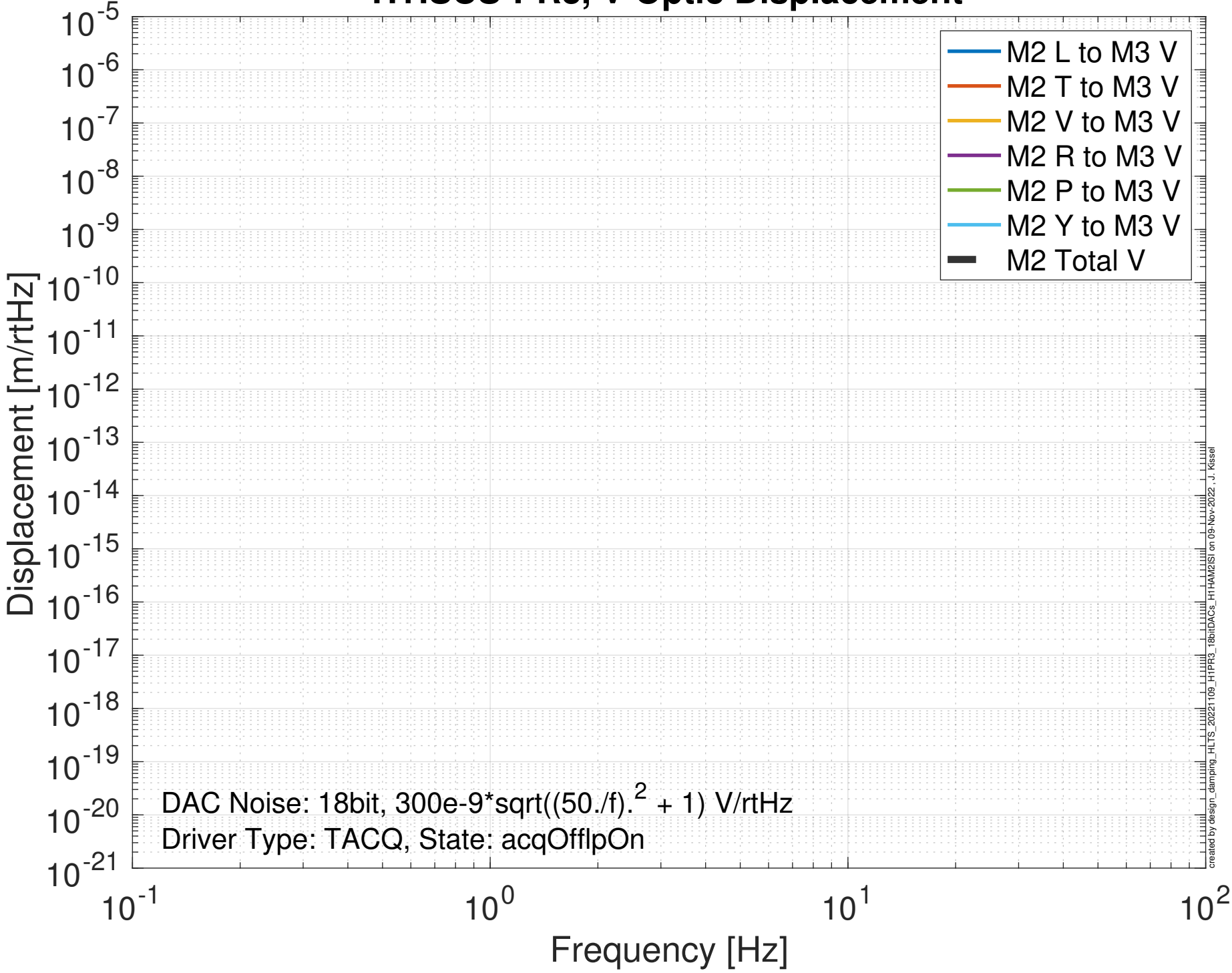

Projected Top Mass Sensor > Optic Noise Budget
H1:SUS-PR3, V Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
M1 L to M3 V
M1 T to M3 V
M1 V to M3 V
M1 R to M3 V
M1 P to M3 V
M1 Y to M3 V
Total V
Raw Sensor Noise
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Global Control Transfer Functions to Optic
H1:SUS-PR3, V
Magnitude [m/N]
Frequency [Hz]
Undamped M1 V to M3 V
Undamped M2 V to M3 V
Undamped M3 V to M3 V
M1 V to M3 V
M2 V to M3 V
M3 V to M3 V
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

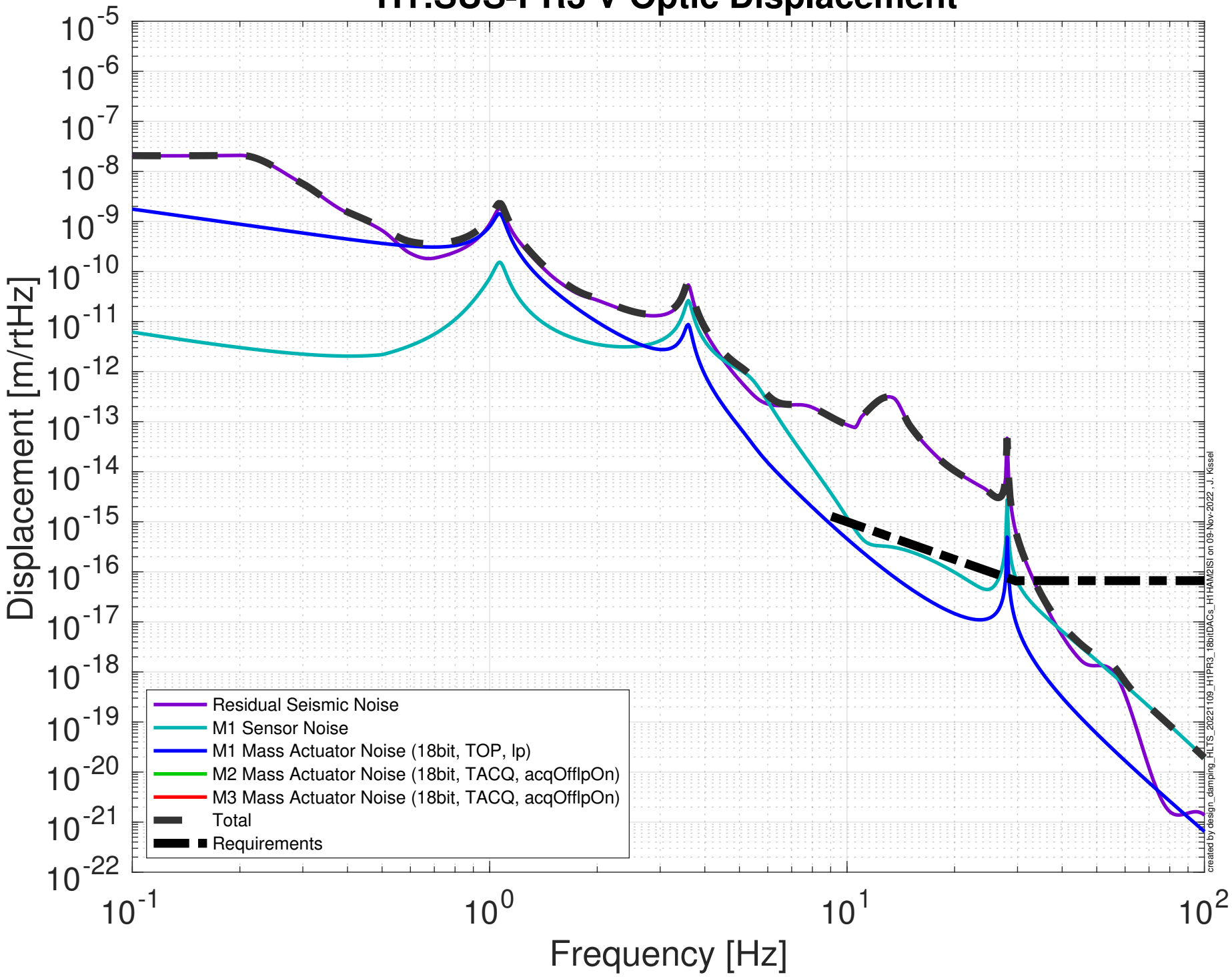

Projected M1 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, V Optic Displacement
M1 L to M3 V
M1 T to M3 V
M1 V to M3 V
M1 R to M3 V
M1 P to M3 V
M1 Y to M3 V
M1 Total V
Displacement [m/rtHz]
Frequency [Hz]
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TOP, State: lp
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

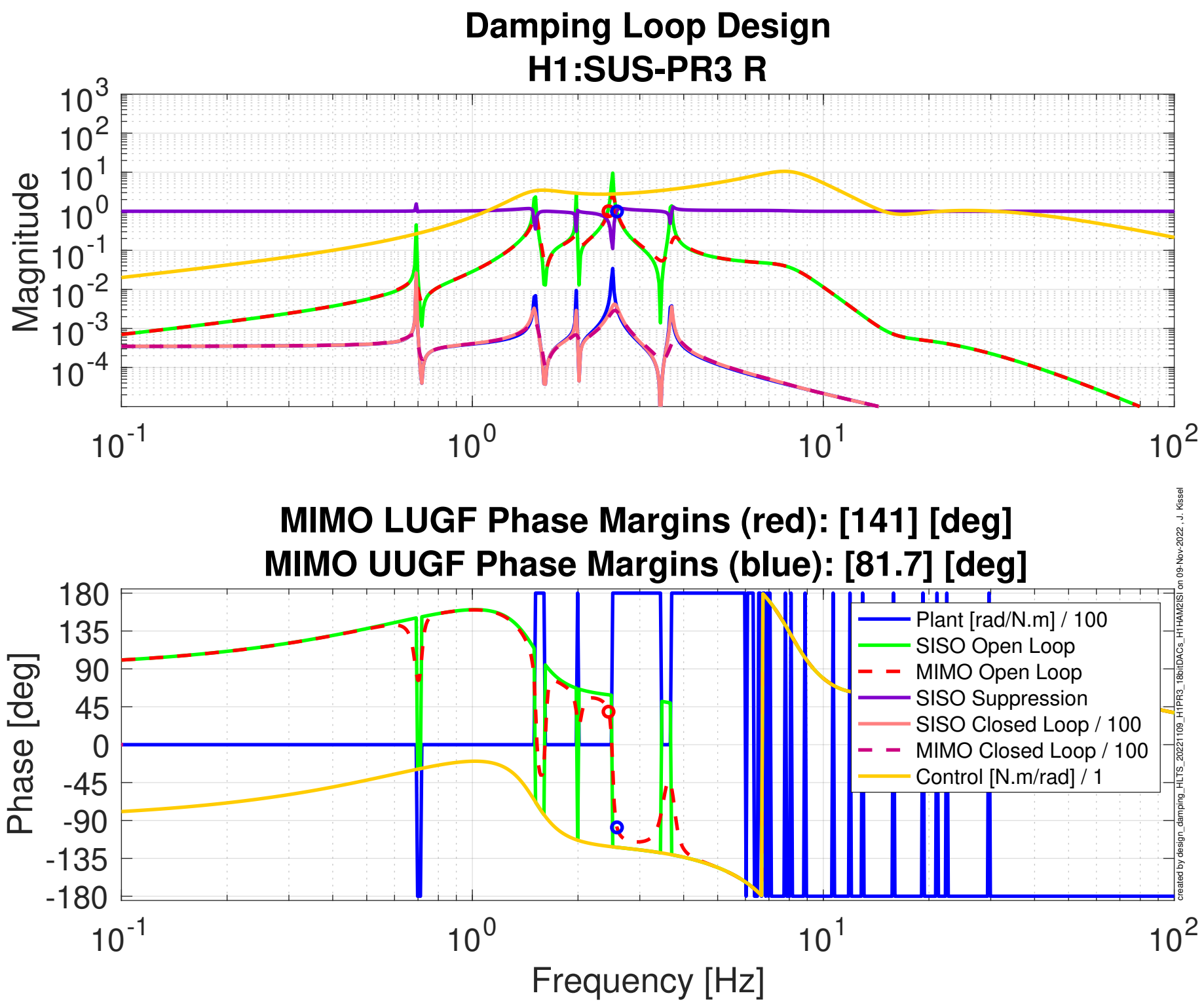
Projected M2 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, V Optic Displacement

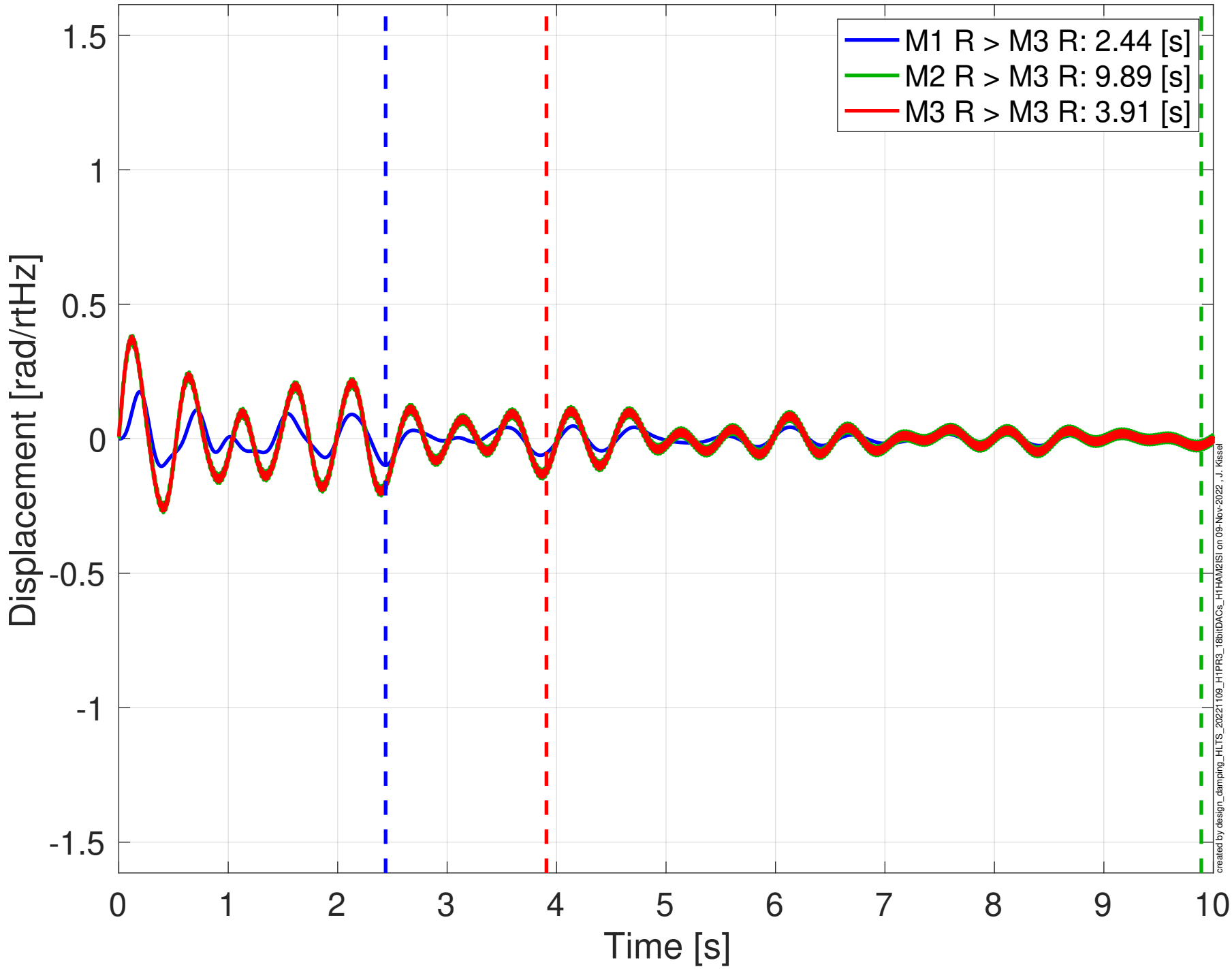


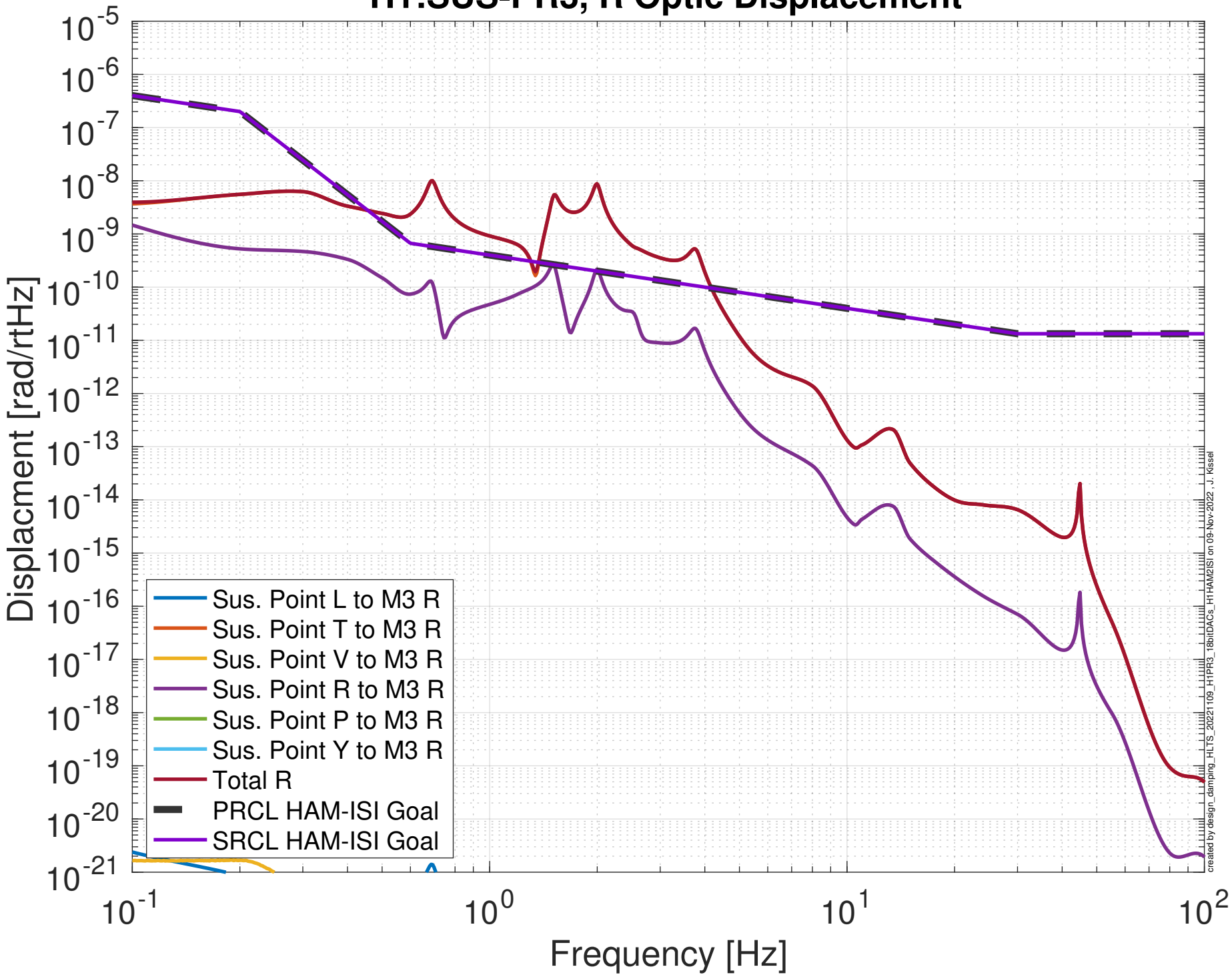

Projected M3 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, V Optic Displacement
M2 L to M3 V
M2 T to M3 V
M2 V to M3 V
M2 R to M3 V
M2 P to M3 V
M2 Y to M3 V
M2 Total V
Displacement [m/rtHz]
Frequency [Hz]
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TACQ, State: acqOfflpOn
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

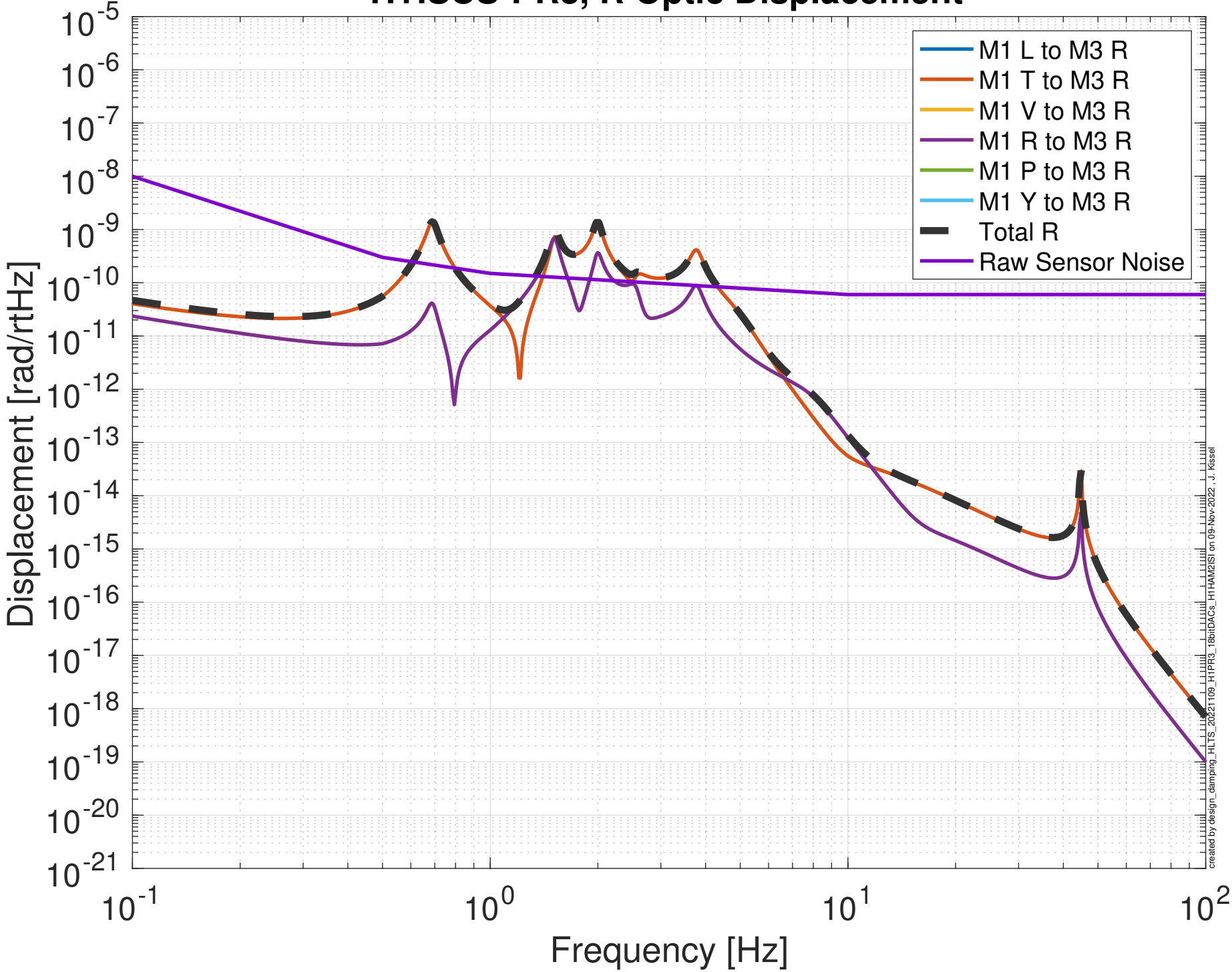
Damping Loop Performance
H1:SUS-PR3 V Optic Displacement

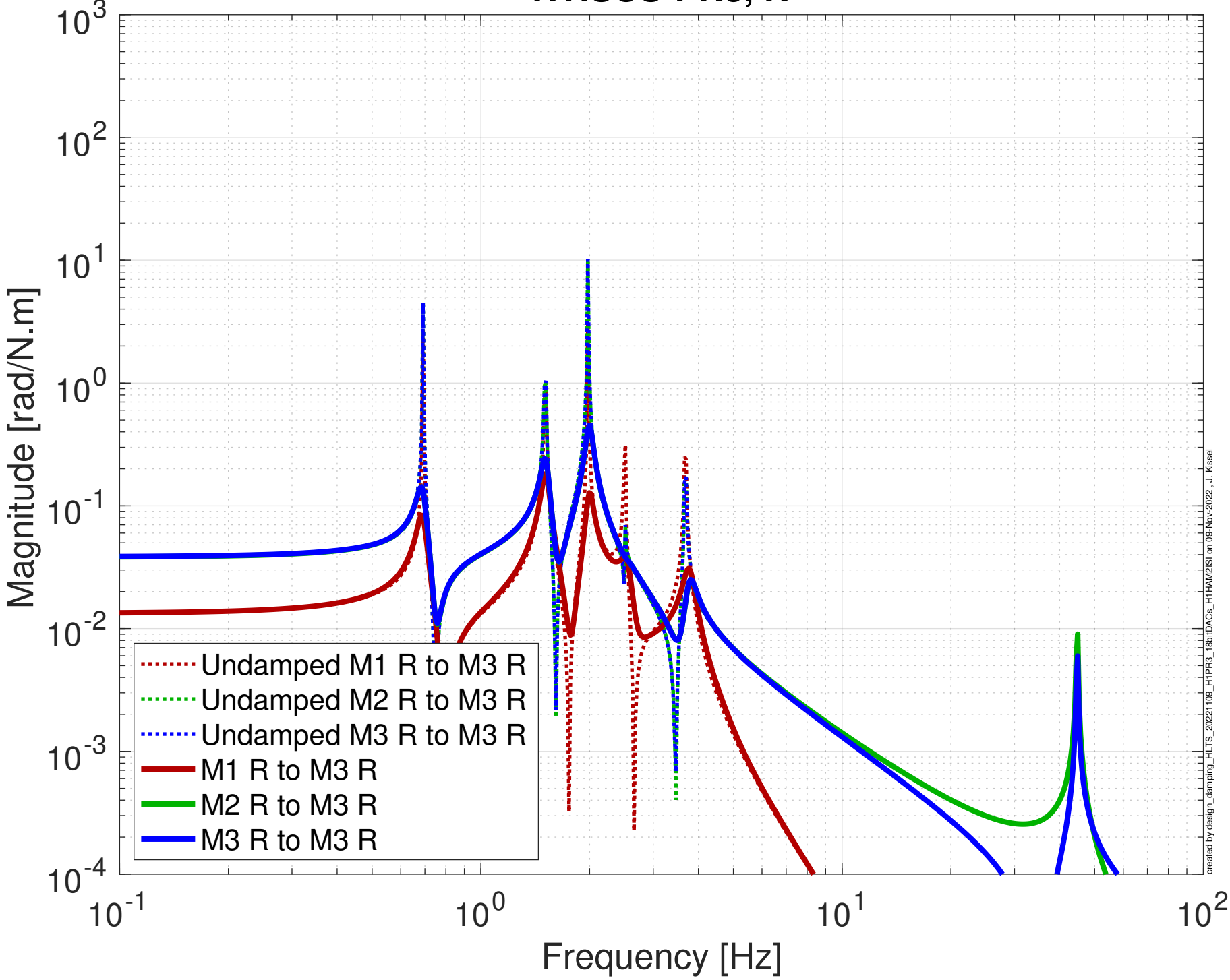


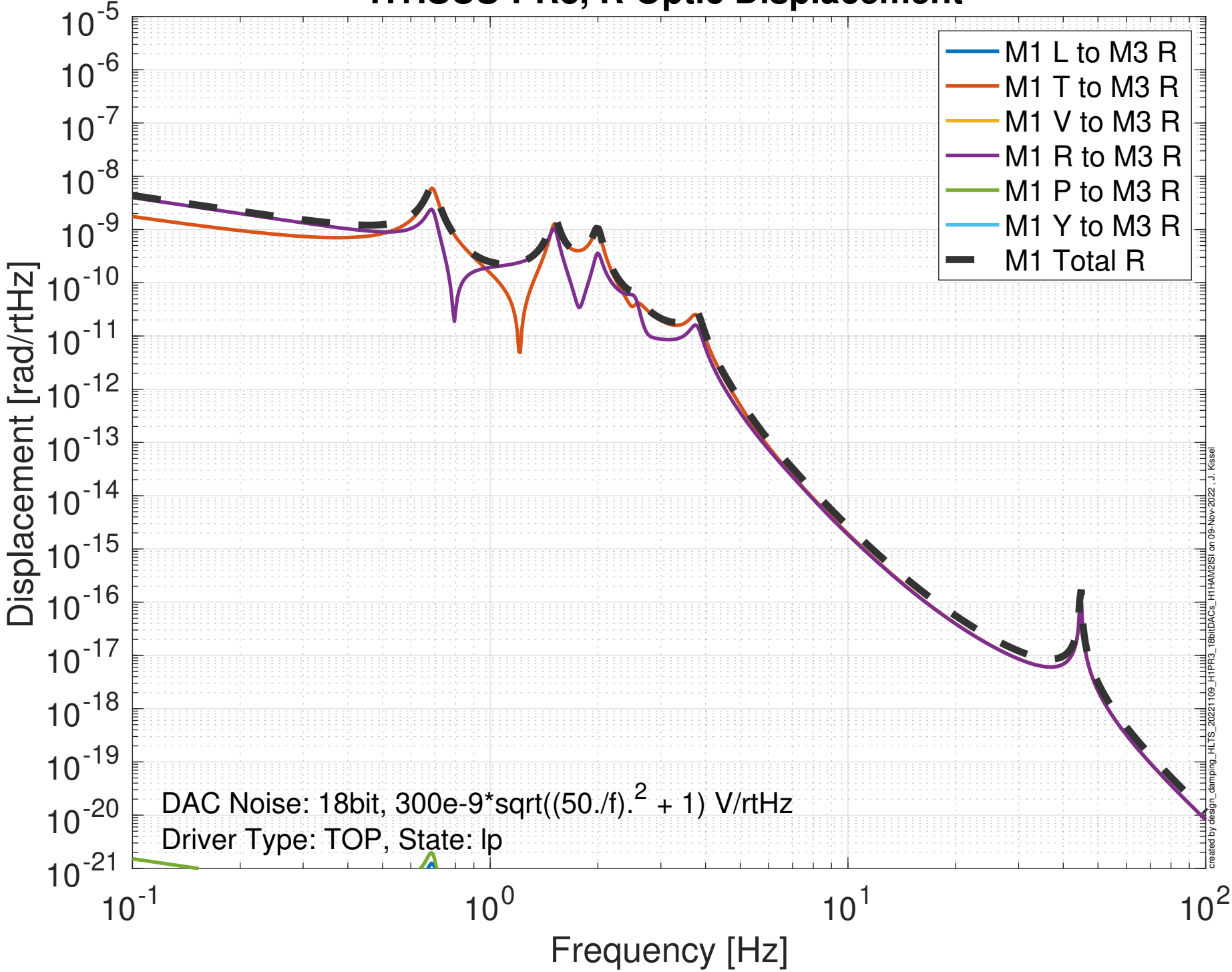

Damping Loop Design
H1:SUS-PR3 R
Magnitude
MIMO LUGF Phase Margins (red): [141] [deg]
MIMO UUGF Phase Margins (blue): [81.7] [deg]
Phase [deg]
Frequency [Hz]
Plant [rad/N.m] / 100
SISO Open Loop
MIMO Open Loop
SISO Suppression
SISO Closed Loop / 100
MIMO Closed Loop / 100
Control [N.m/rad] / 1
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Damped Impulse Response
H1:SUS-PR3 R
M1 R > M3 R: 2.44 [s]
M2 R > M3 R: 9.89 [s]
M3 R > M3 R: 3.91 [s]
Displacement [rad/rtHz]
Time [s]
1.5
1
0.5
0
-0.5
-1
-1.5
0
1
2
3
4
5
6
7
8
9
10
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

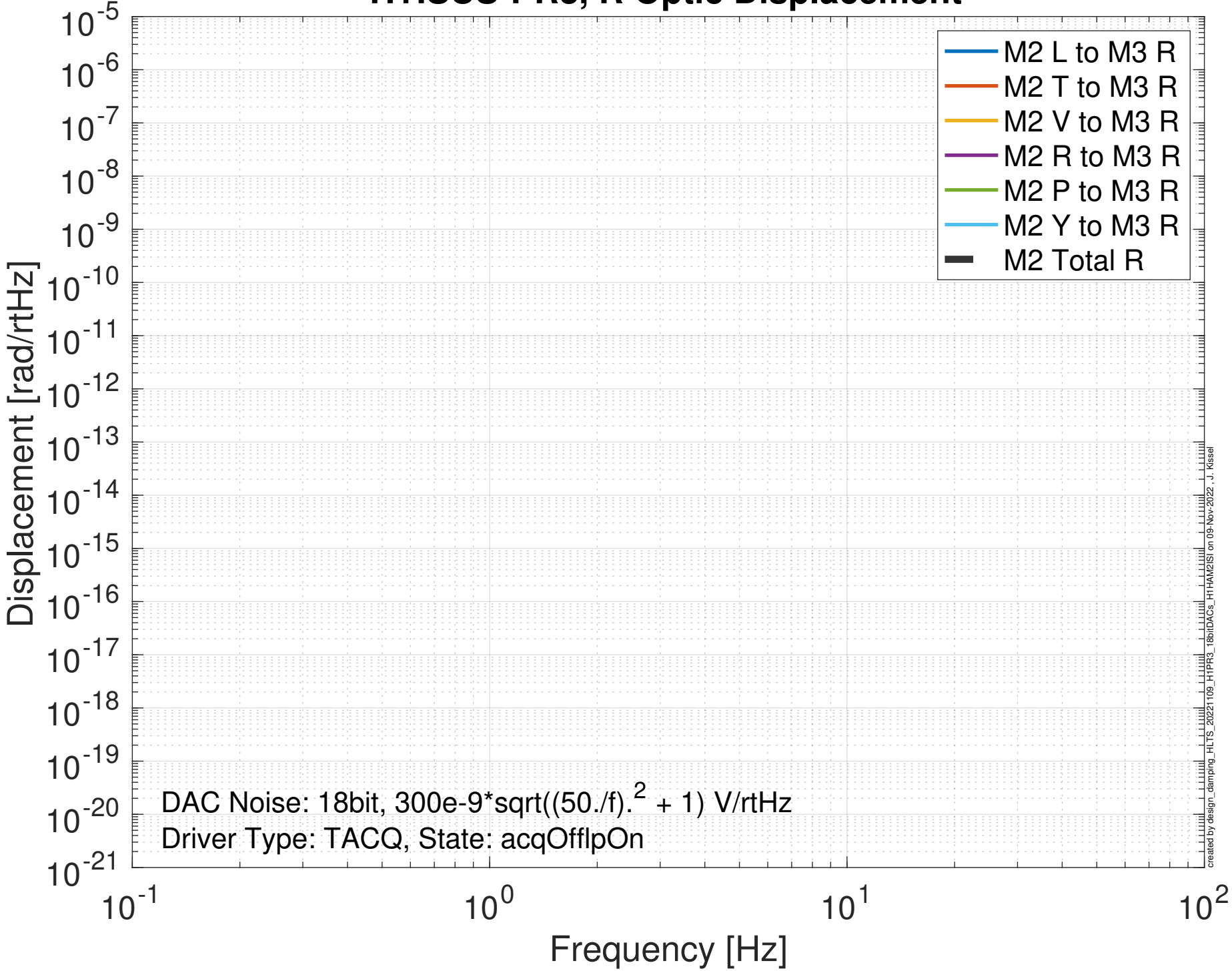

Projected Sus. Point > Optic Seismic Noise Budget
H1:SUS-PR3, R Optic Displacement
Displacment [rad/rtHz]
Frequency [Hz]
Sus. Point L to M3 R
Sus. Point T to M3 R
Sus. Point V to M3 R
Sus. Point R to M3 R
Sus. Point P to M3 R
Sus. Point Y to M3 R
Total R
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Projected Top Mass Sensor > Optic Noise Budget
H1:SUS-PR3, R Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
M1 L to M3 R
M1 T to M3 R
M1 V to M3 R
M1 R to M3 R
M1 P to M3 R
M1 Y to M3 R
Total R
Raw Sensor Noise
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

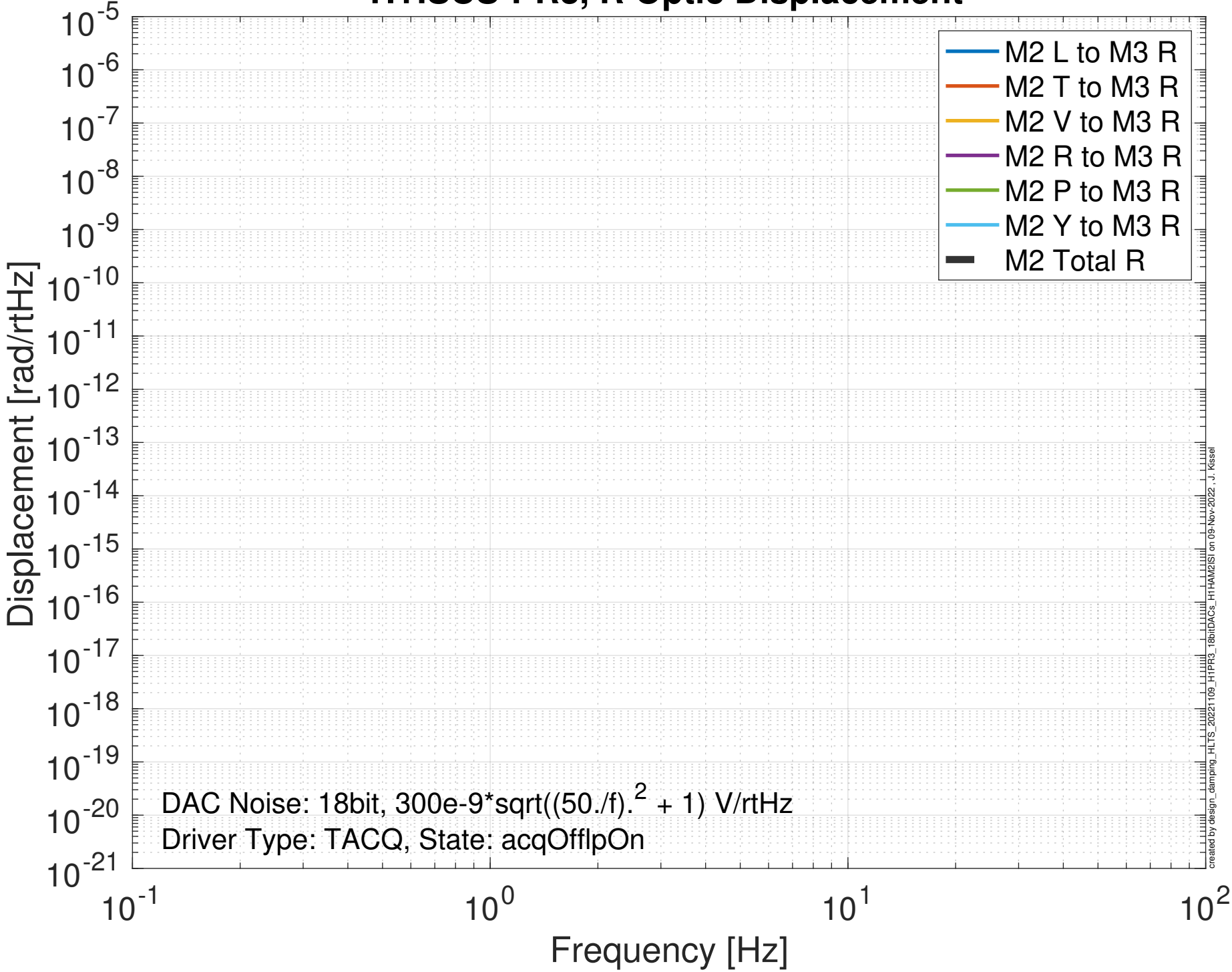

Global Control Transfer Functions to Optic
H1:SUS-PR3, R
Magnitude [rad/N.m]
Frequency [Hz]
Undamped M1 R to M3 R
Undamped M2 R to M3 R
Undamped M3 R to M3 R
M1 R to M3 R
M2 R to M3 R
M3 R to M3 R
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

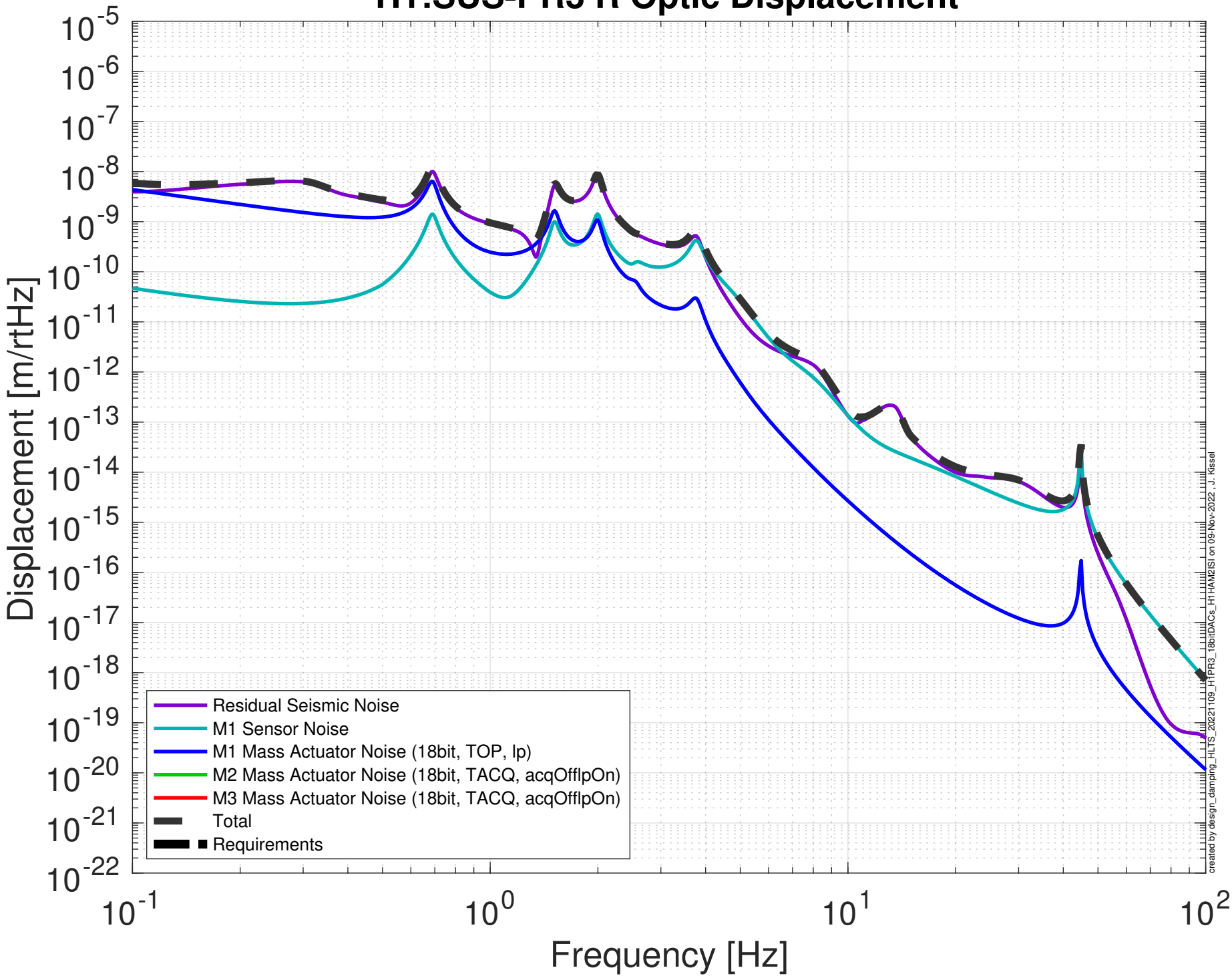

Projected M1 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, R Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
M1 L to M3 R
M1 T to M3 R
M1 V to M3 R
M1 R to M3 R
M1 P to M3 R
M1 Y to M3 R
M1 Total R
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TOP, State: lp
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

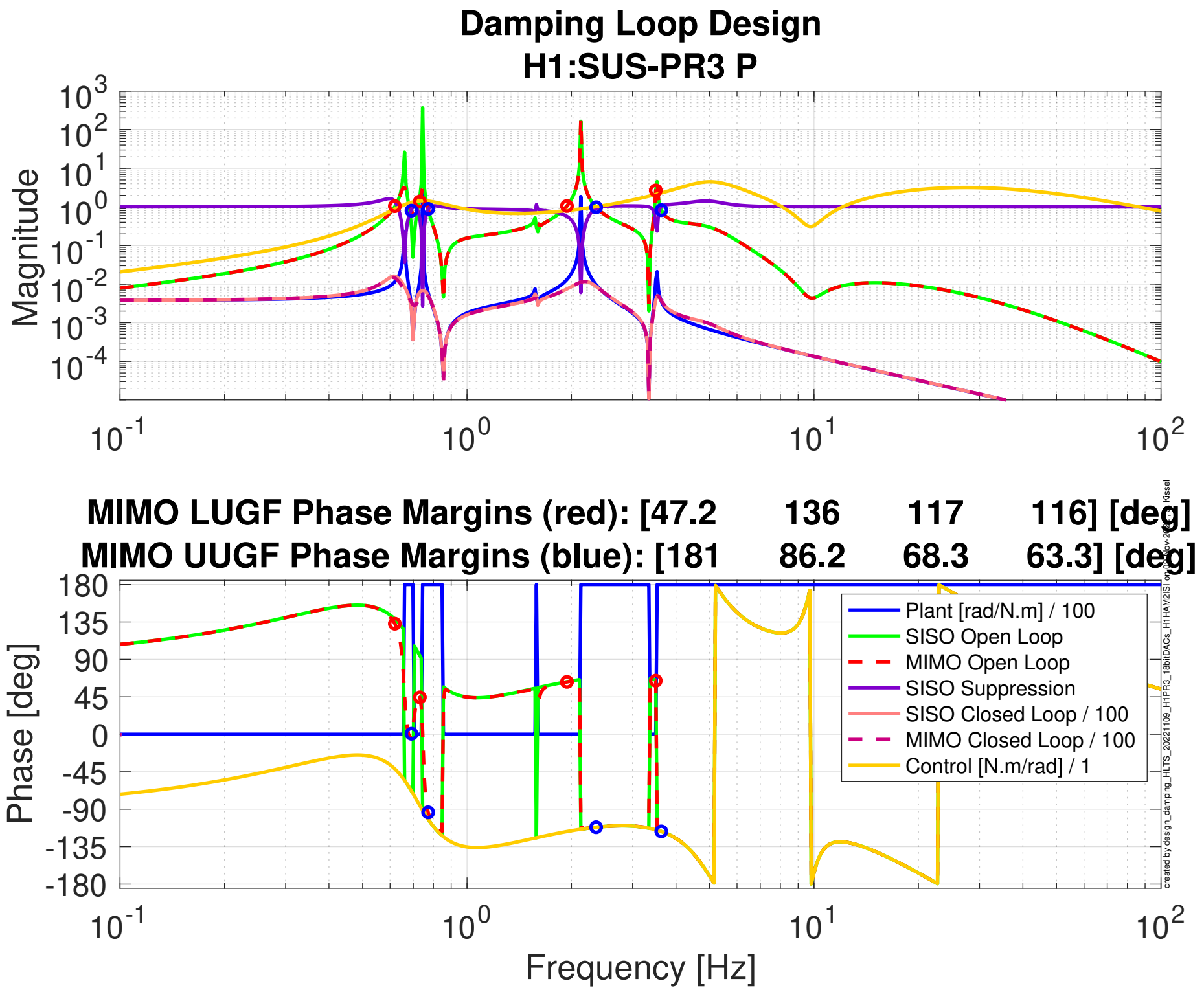
Projected M2 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, R Optic Displacement

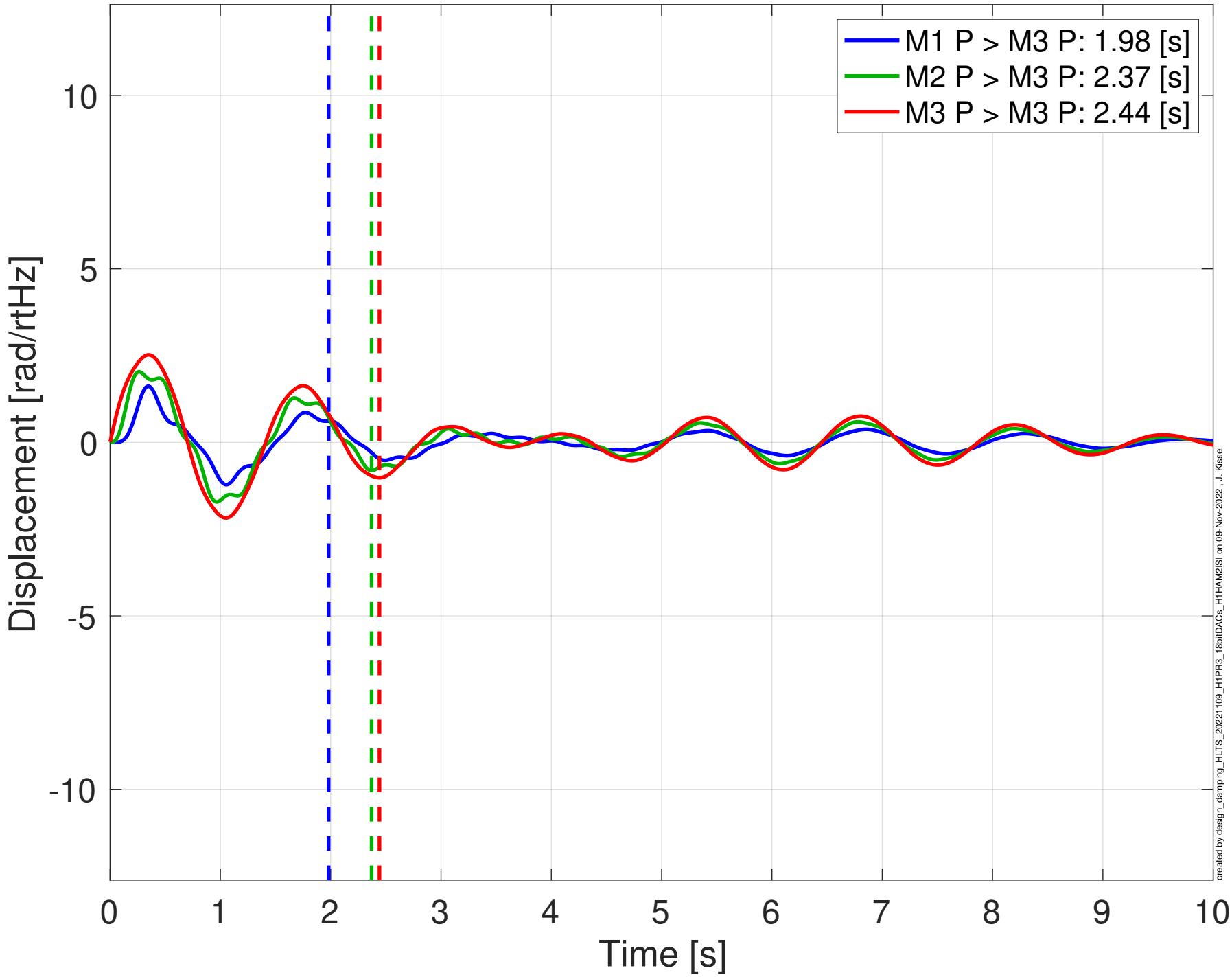


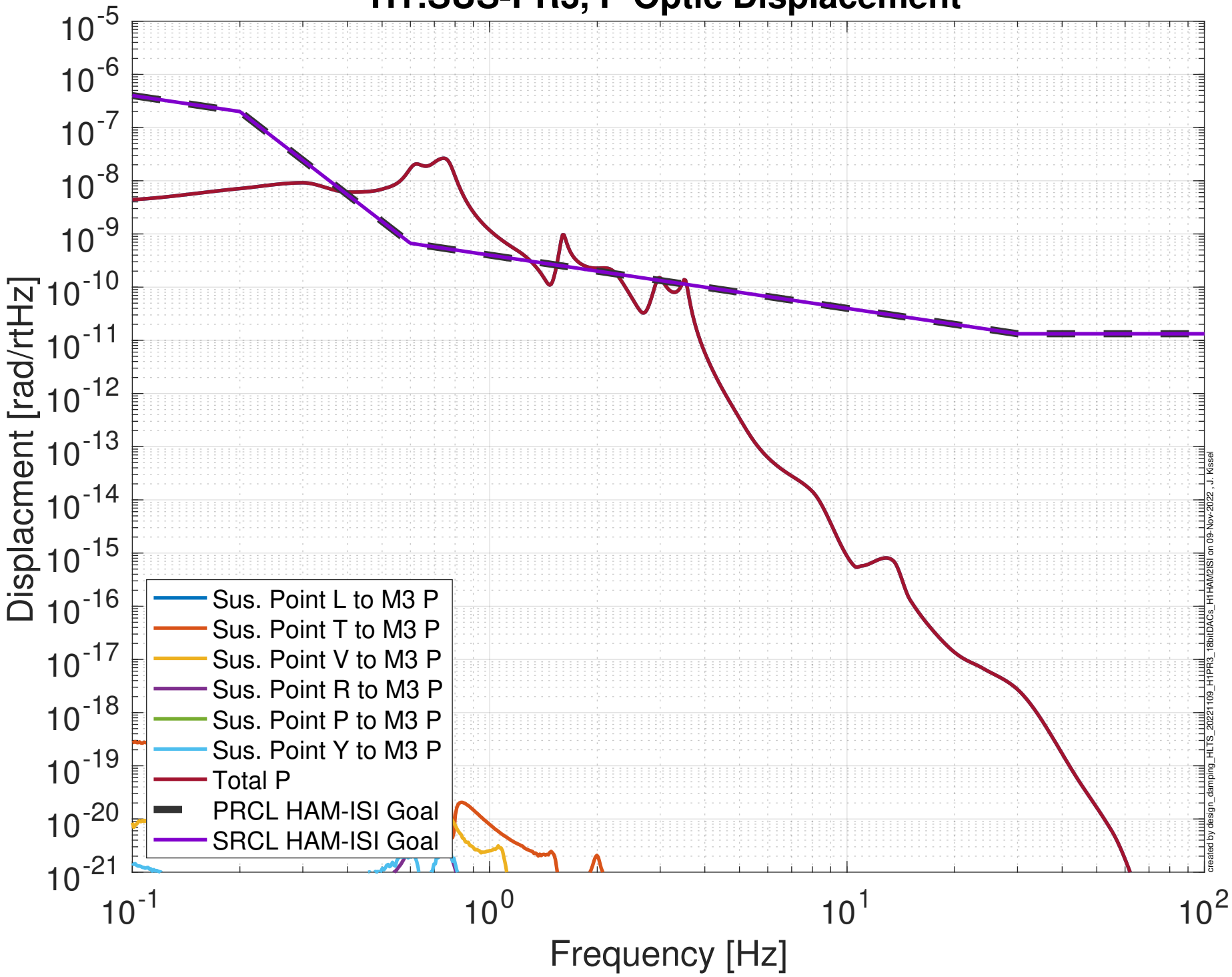
Projected M3 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, R Optic Displacement

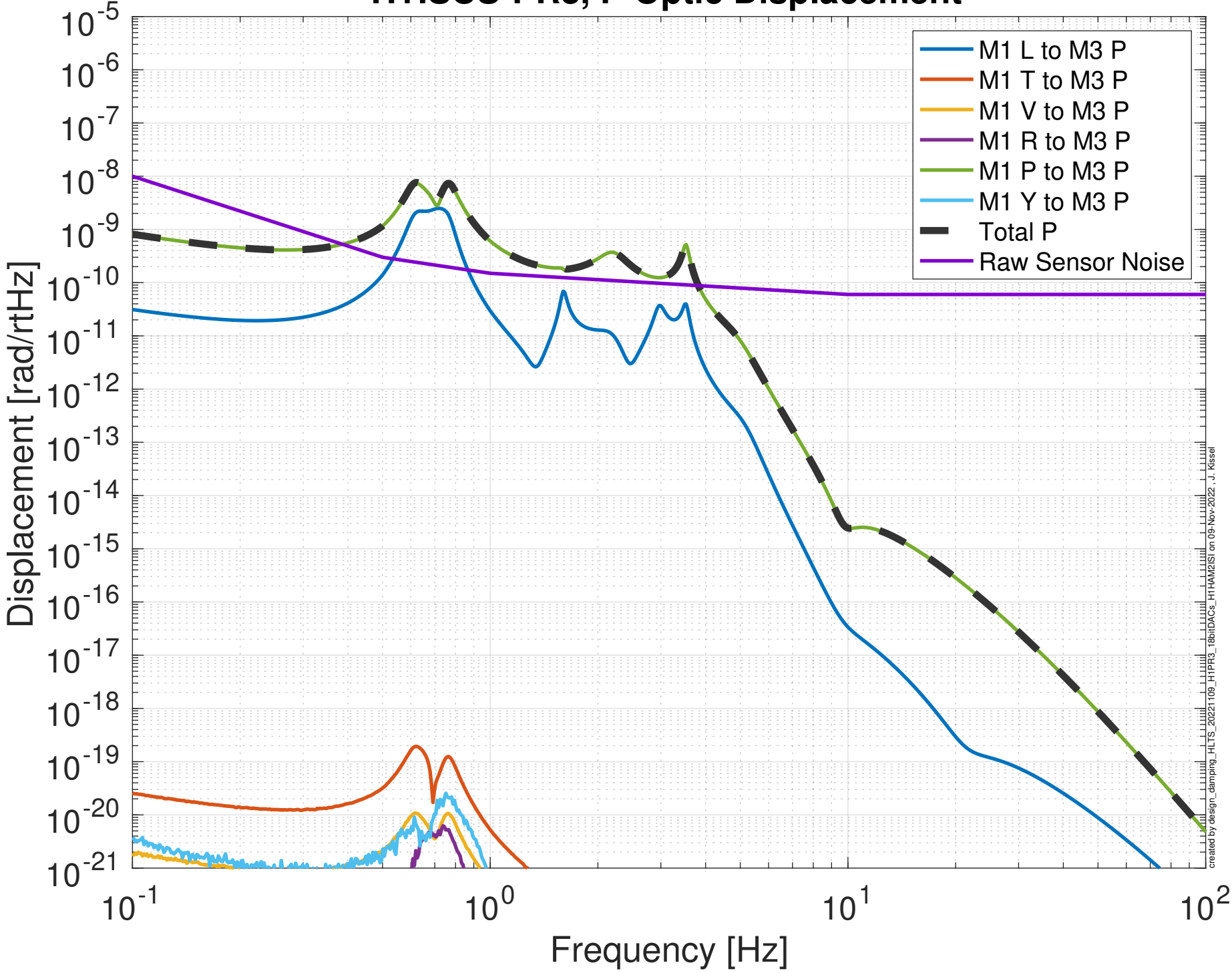


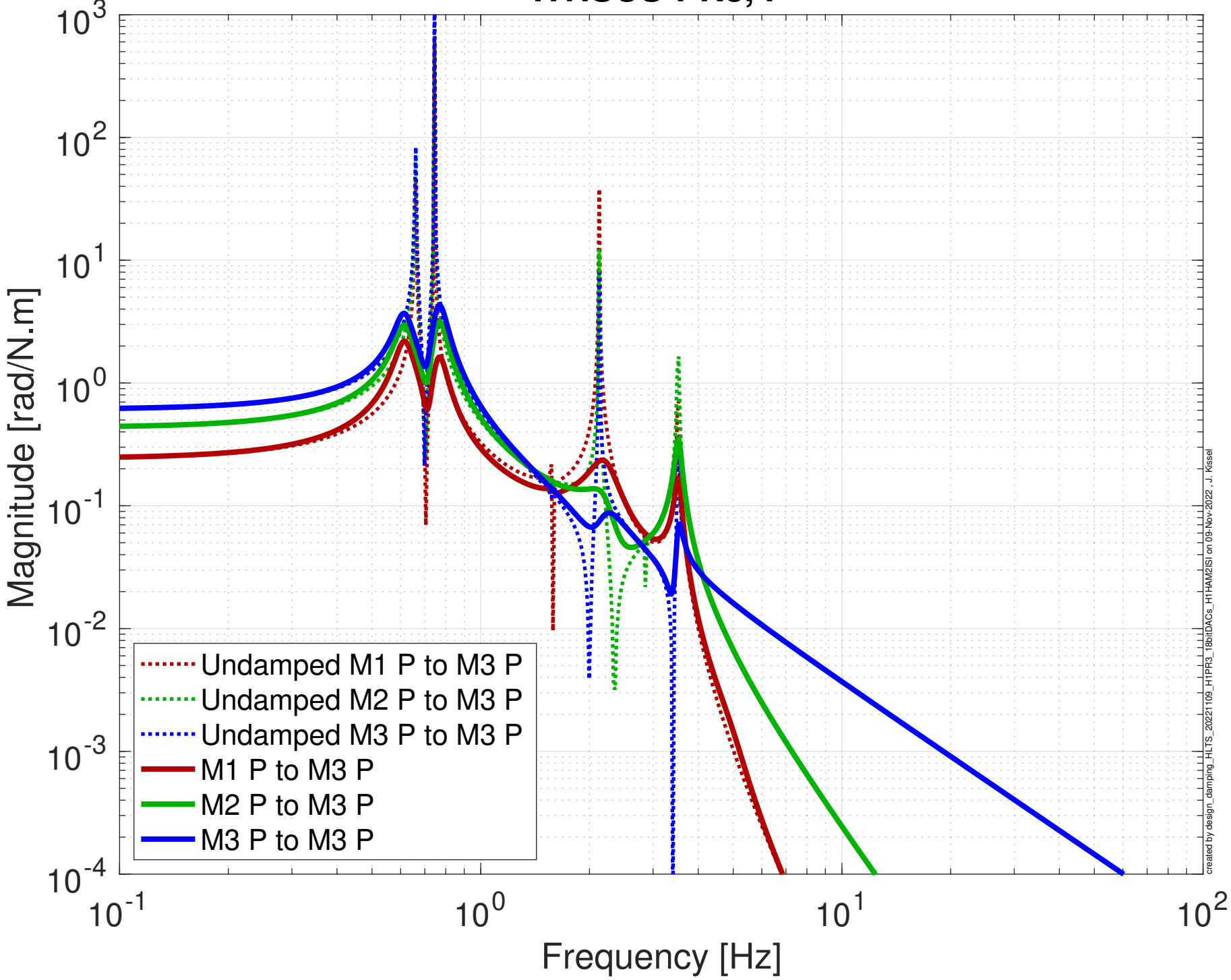

Damping Loop Performance
H1:SUS-PR3 R Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
Residual Seismic Noise
M1 Sensor Noise
M1 Mass Actuator Noise (18bit, TOP, lp)
M2 Mass Actuator Noise (18bit, TACQ, acqOfflpOn)
M3 Mass Actuator Noise (18bit, TACQ, acqOfflpOn)
Total
Requirements
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022, J. Kissel

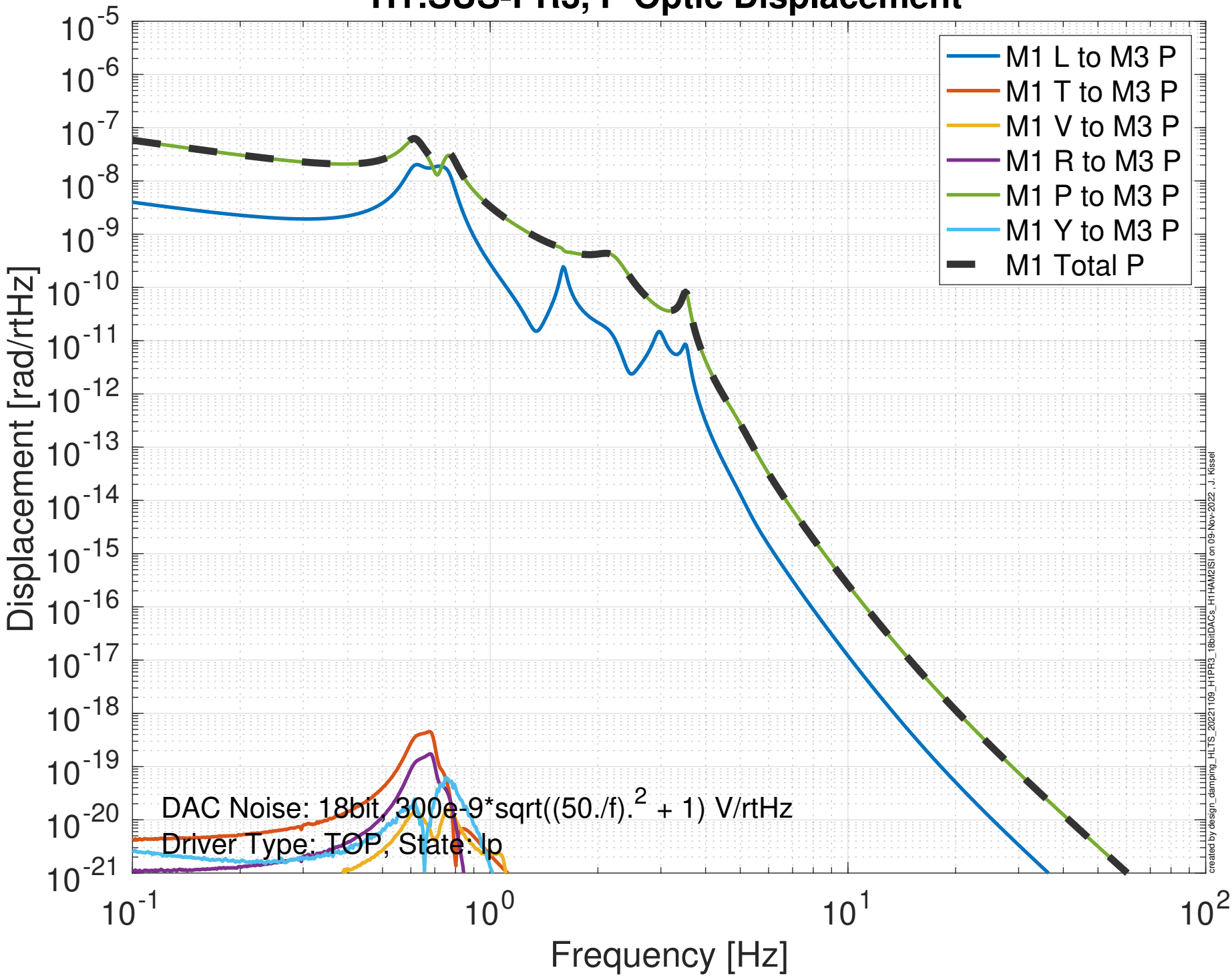

Damping Loop Design
H1:SUS-PR3 P
Magnitude
MIMO LUGF Phase Margins (red): [47.2 136 117 116] [deg]
MIMO UUGF Phase Margins (blue): [181 86.2 68.3 63.3] [deg]
Phase [deg]
Frequency [Hz]
Plant [rad/N.m] / 100
SISO Open Loop
MIMO Open Loop
SISO Suppression
SISO Closed Loop / 100
MIMO Closed Loop / 100
Control [N.m/rad] / 1
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 Kissel

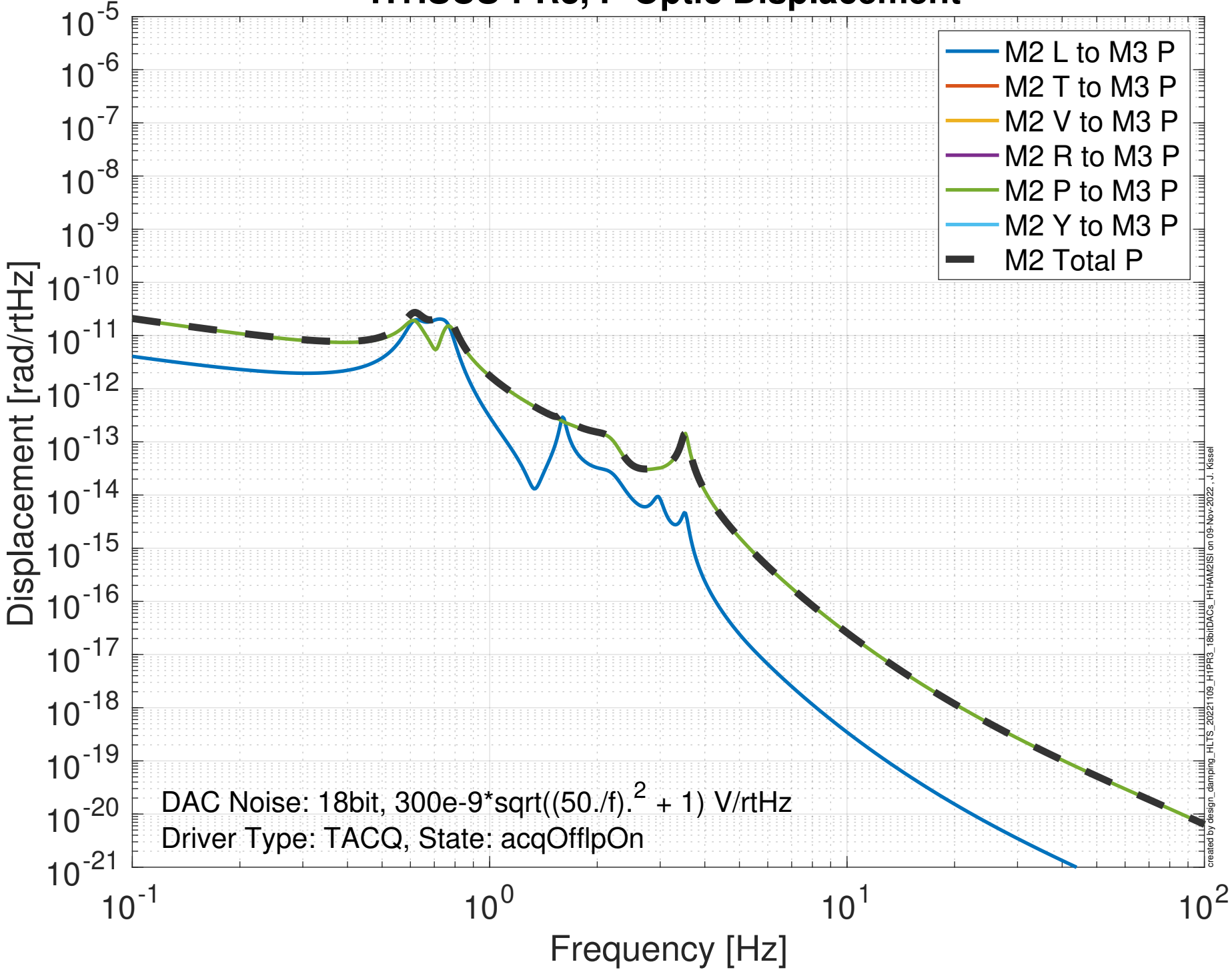

Damped Impulse Response
H1:SUS-PR3 P
M1 P > M3 P: 1.98 [s]
M2 P > M3 P: 2.37 [s]
M3 P > M3 P: 2.44 [s]
Displacement [rad/rtHz]
Time [s]
10
5
0
-5
-10
0
1
2
3
4
5
6
7
8
9
10
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

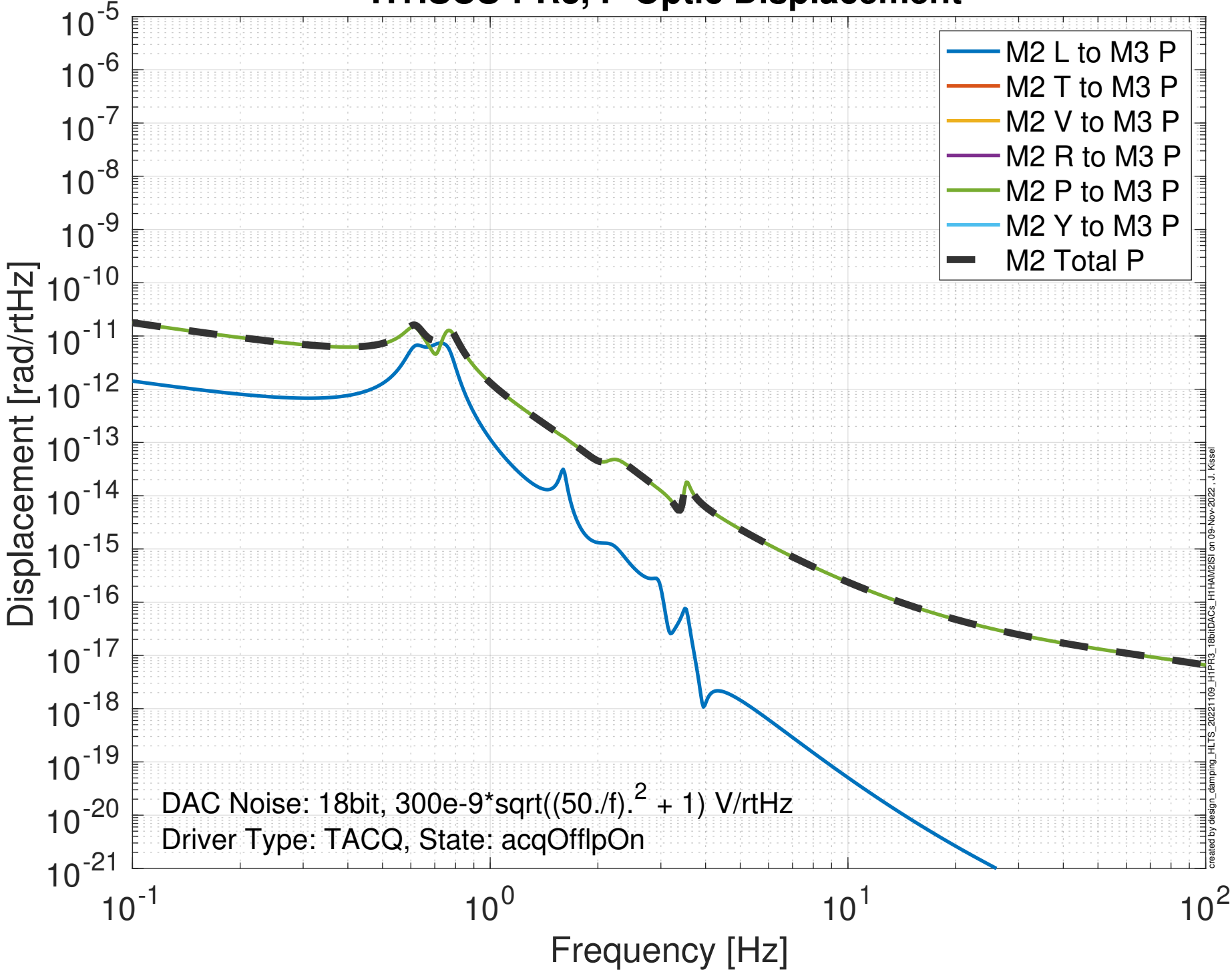

Projected Sus. Point > Optic Seismic Noise Budget
H1:SUS-PR3, P Optic Displacement
Displacment [rad/rtHz]
Frequency [Hz]
Sus. Point L to M3 P
Sus. Point T to M3 P
Sus. Point V to M3 P
Sus. Point R to M3 P
Sus. Point P to M3 P
Sus. Point Y to M3 P
Total P
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

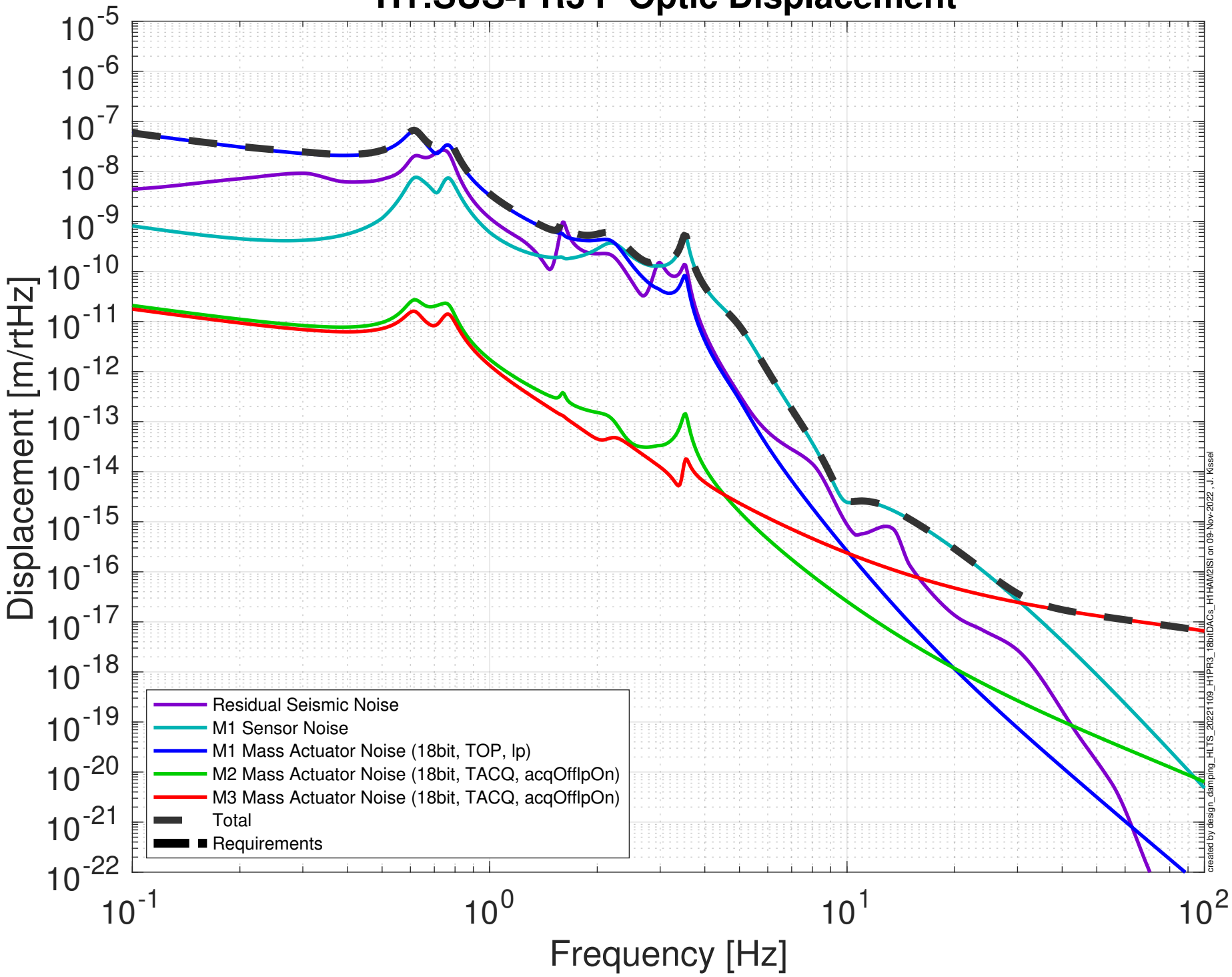

Projected Top Mass Sensor > Optic Noise Budget
H1:SUS-PR3, P Optic Displacement
M1 L to M3 P
M1 T to M3 P
M1 V to M3 P
M1 R to M3 P
M1 P to M3 P
M1 Y to M3 P
Total P
Raw Sensor Noise
Displacement [rad/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Global Control Transfer Functions to Optic
H1:SUS-PR3, P
Magnitude [rad/N.m]
Frequency [Hz]
Undamped M1 P to M3 P
Undamped M2 P to M3 P
Undamped M3 P to M3 P
M1 P to M3 P
M2 P to M3 P
M3 P to M3 P
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

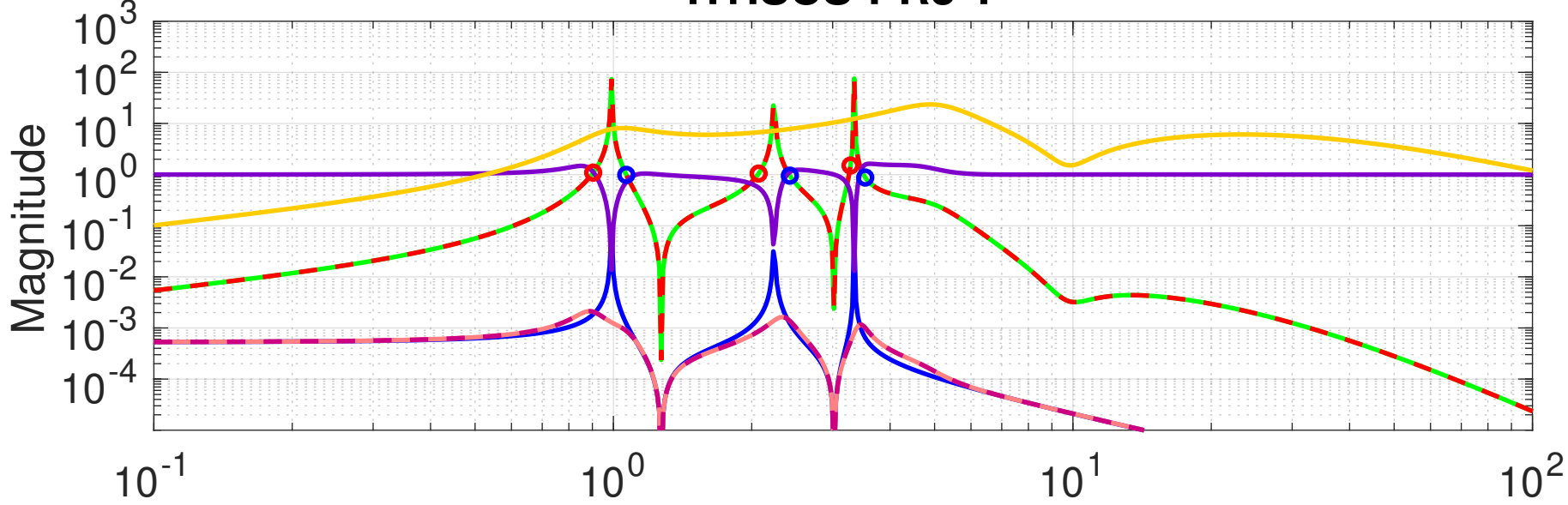

Projected M1 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, P Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
M1 L to M3 P
M1 T to M3 P
M1 V to M3 P
M1 R to M3 P
M1 P to M3 P
M1 Y to M3 P
M1 Total P
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TOP, State: lp
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Projected M2 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, P Optic Displacement
M2 L to M3 P
M2 T to M3 P
M2 V to M3 P
M2 R to M3 P
M2 P to M3 P
M2 Y to M3 P
M2 Total P
Displacement [rad/rtHz]
Frequency [Hz]
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TACQ, State: acqOfflpOn
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Projected M3 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, P Optic Displacement
M2 L to M3 P
M2 T to M3 P
M2 V to M3 P
M2 R to M3 P
M2 P to M3 P
M2 Y to M3 P
M2 Total P
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TACQ, State: acqOfflpOn
Displacement [rad/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

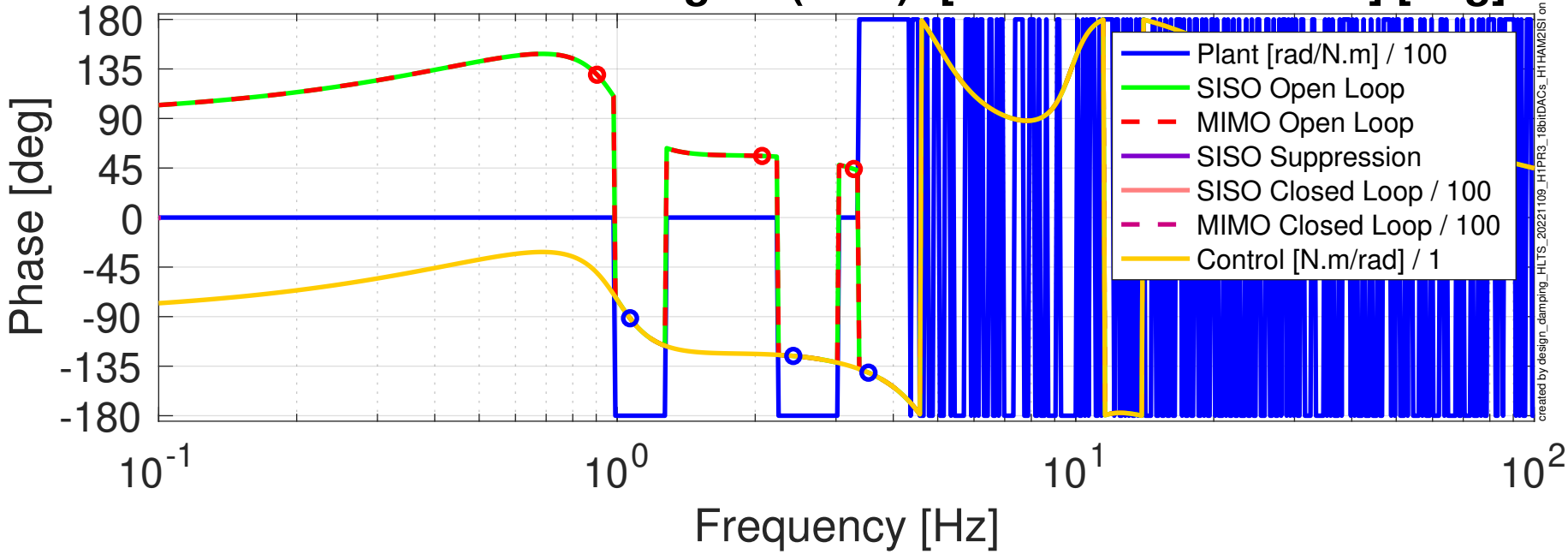

Damping Loop Performance
H1:SUS-PR3 P Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
Residual Seismic Noise
M1 Sensor Noise
M1 Mass Actuator Noise (18bit, TOP, lp)
M2 Mass Actuator Noise (18bit, TACQ, acqOfflpOn)
M3 Mass Actuator Noise (18bit, TACQ, acqOfflpOn)
Total
Requirements
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

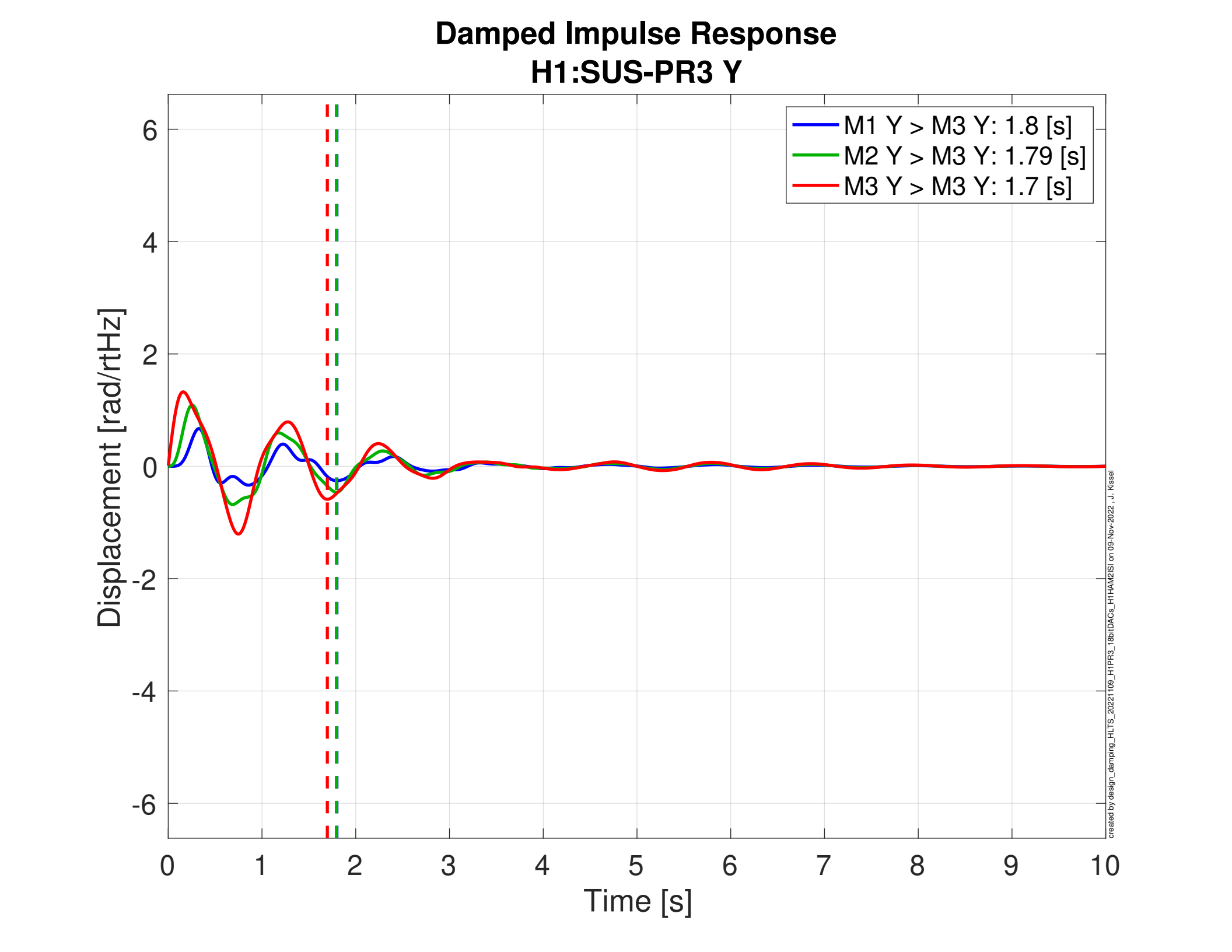
Damping Loop Design
H1:SUS-PR3 Y

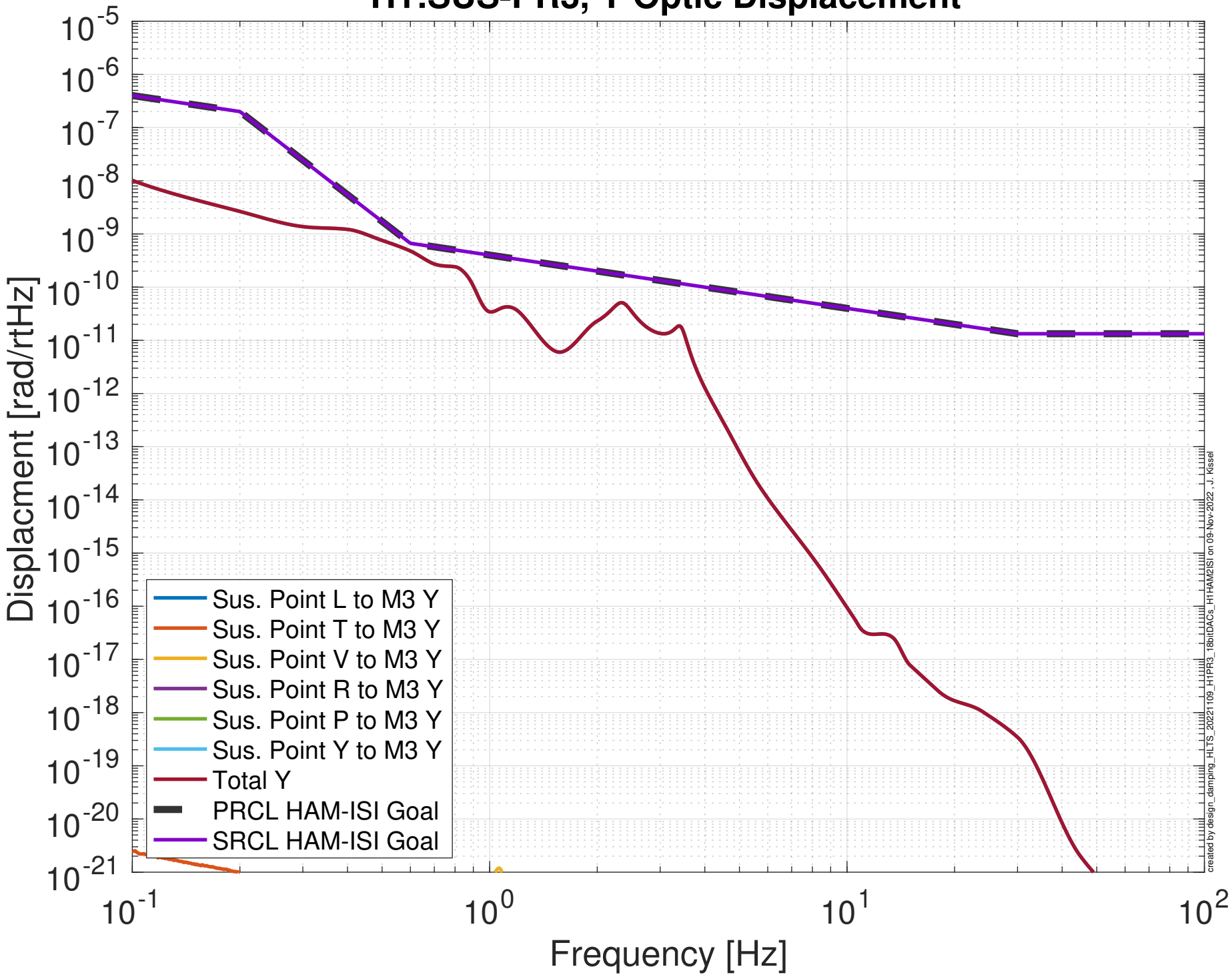


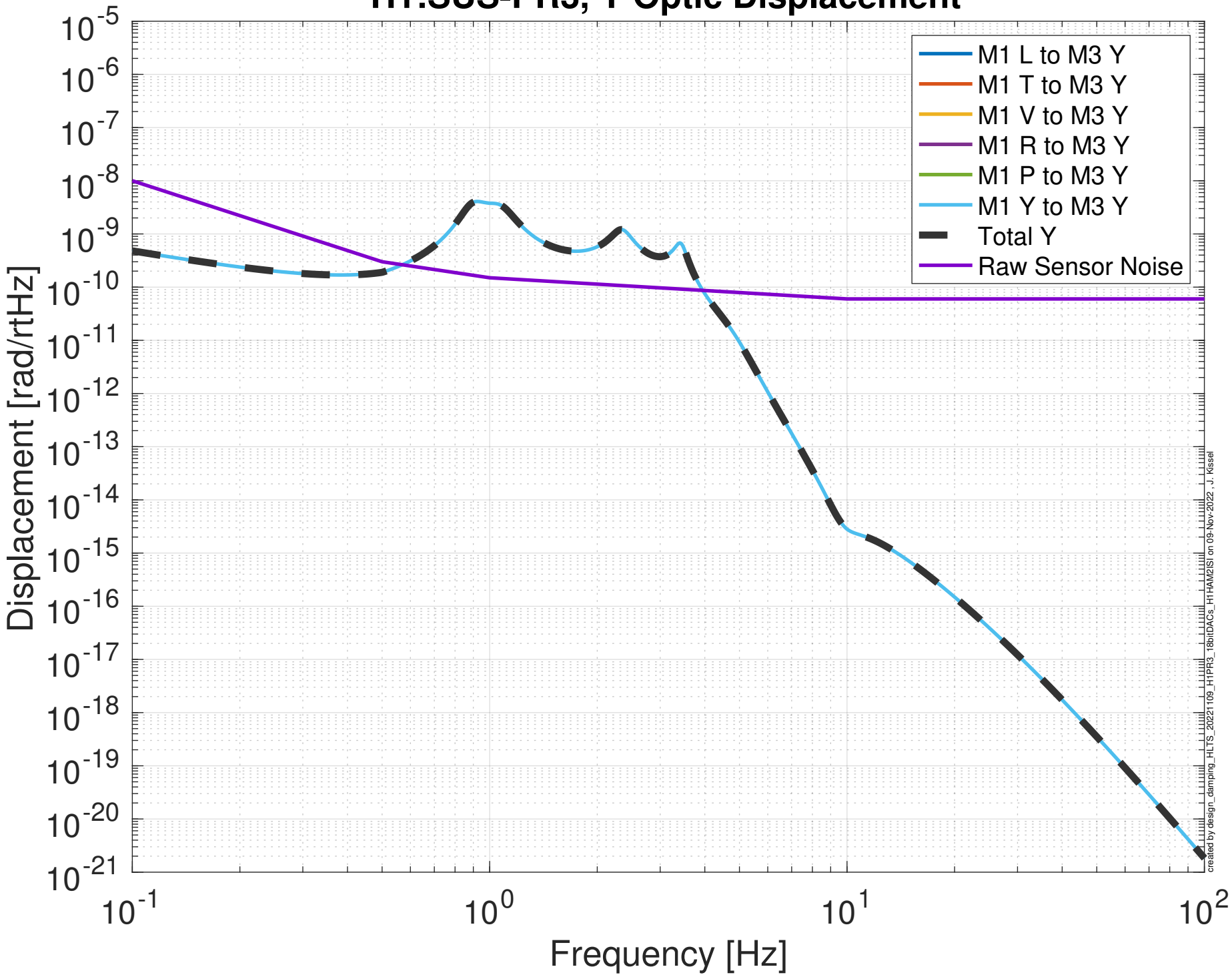
MIMO LUGF Phase Margins (red): [50.3 124 136] [deg]

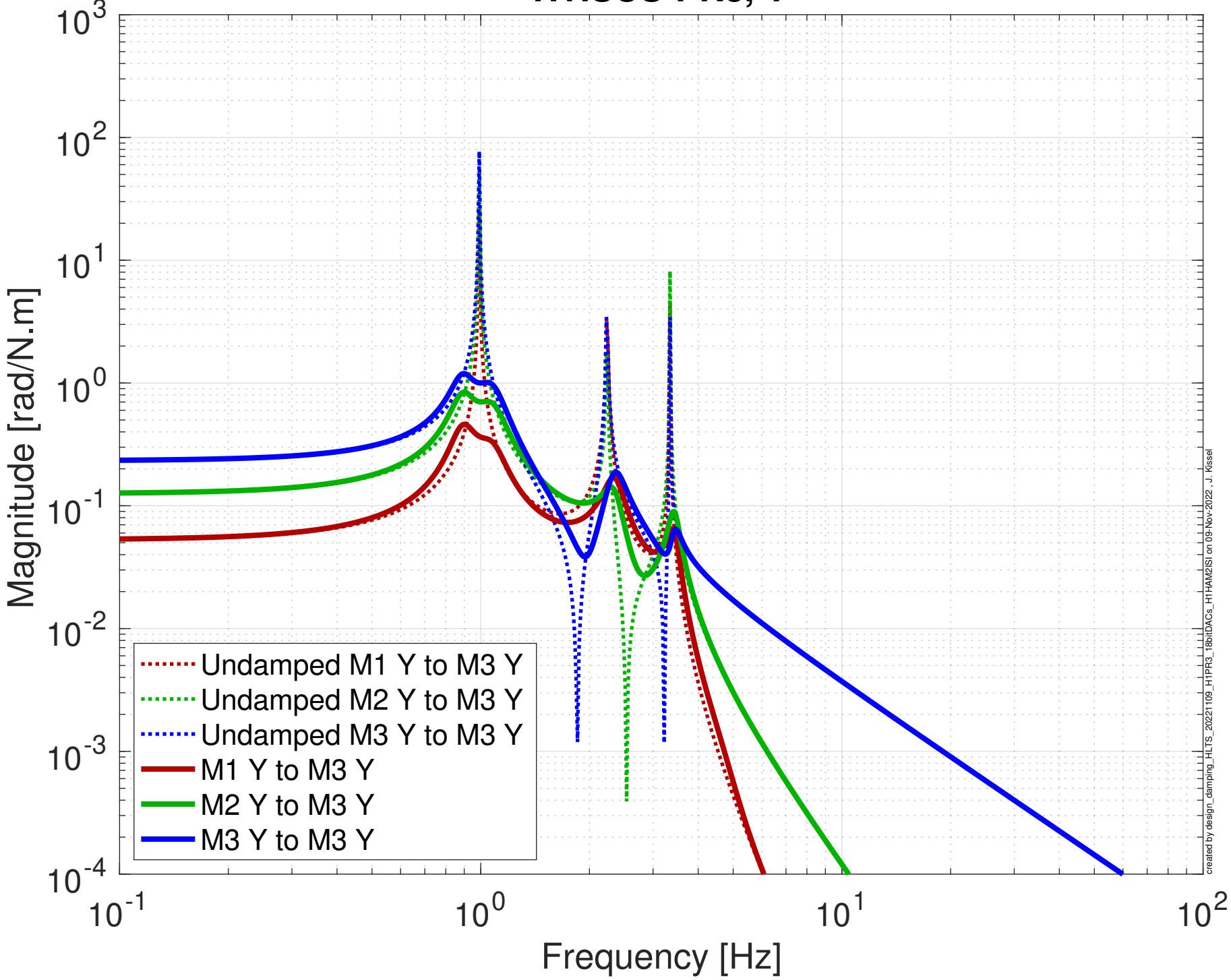
MIMO UUGF Phase Margins (blue): [88.5 54.3 39.1] [deg]

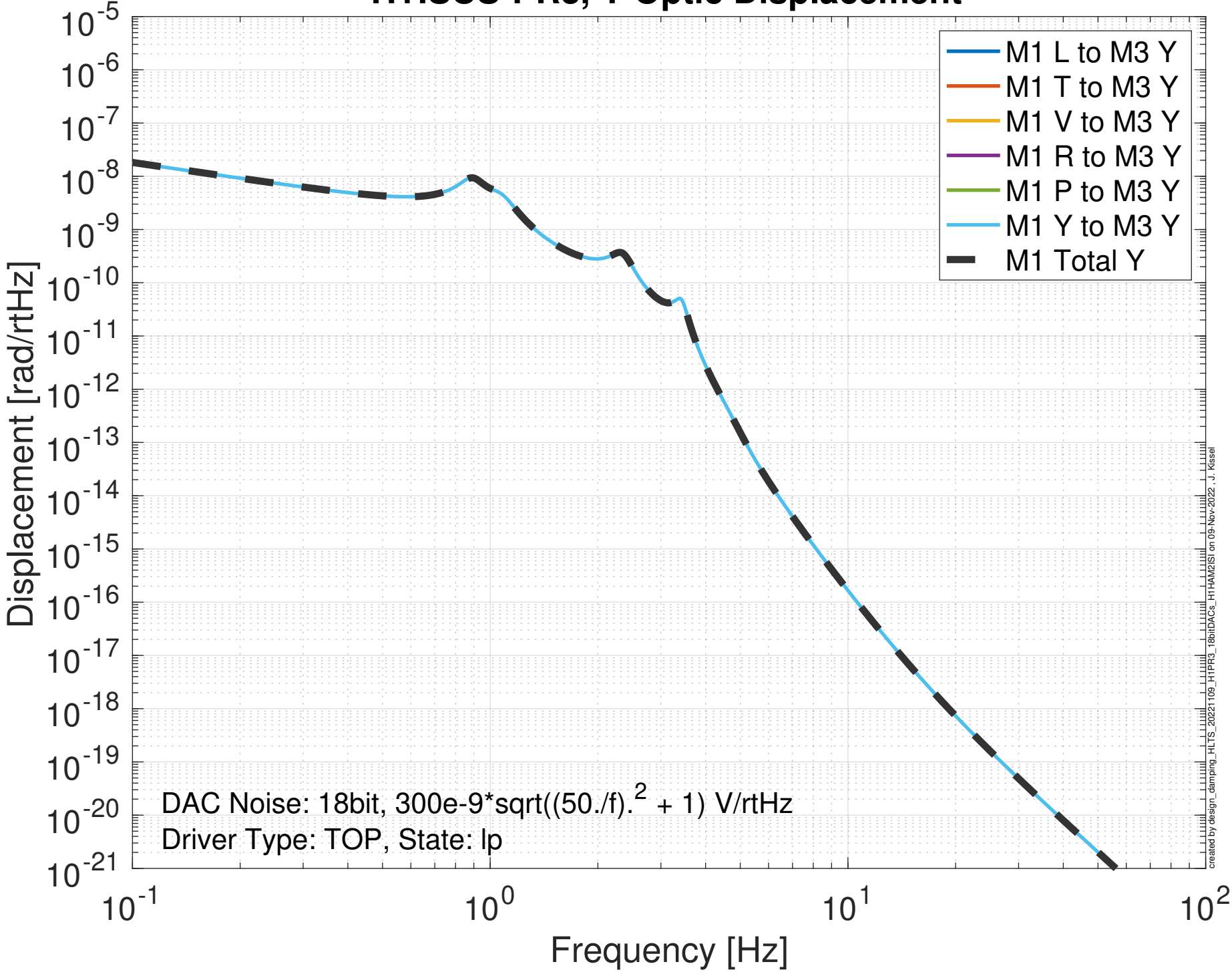


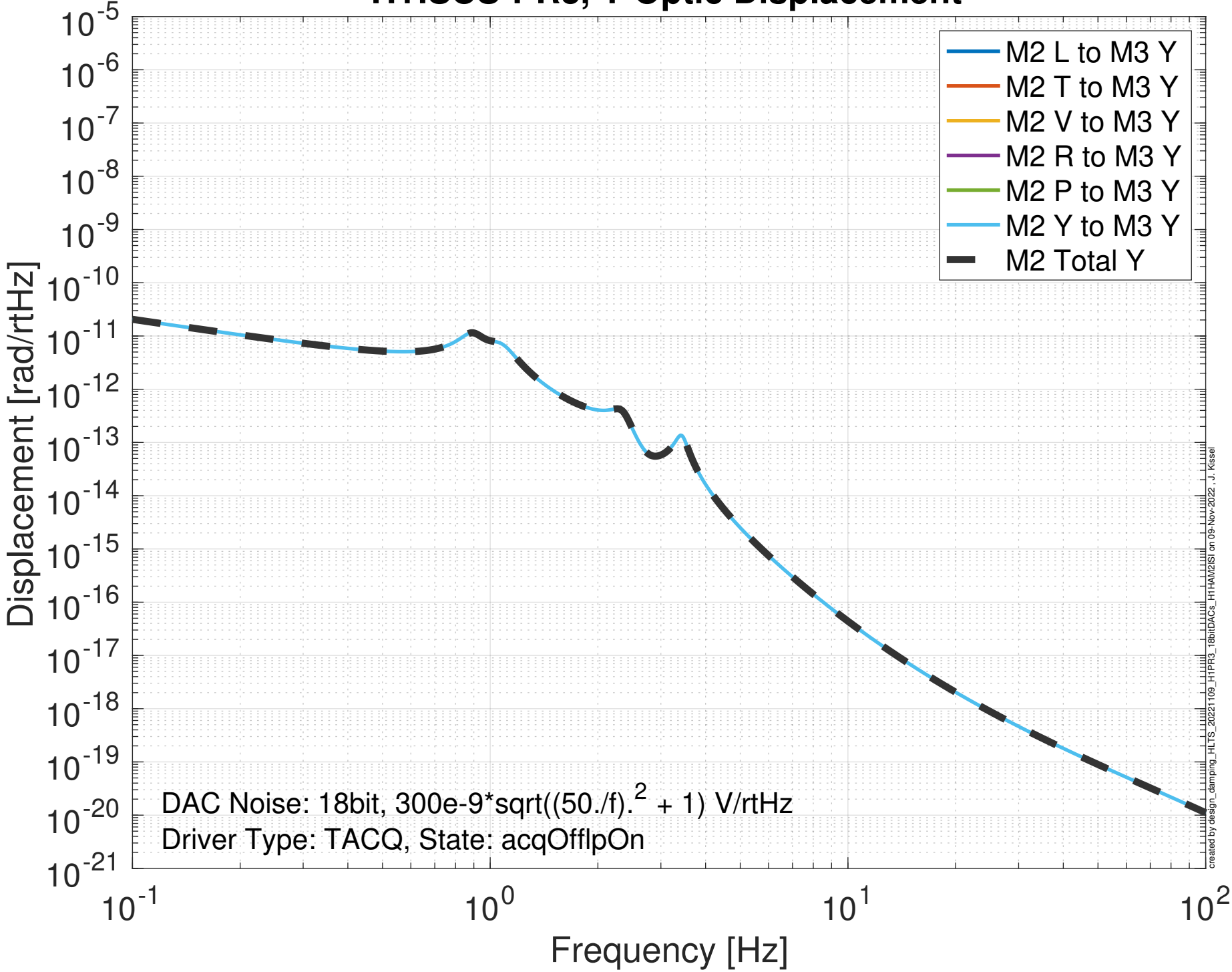

Damped Impulse Response
H1:SUS-PR3 Y
M1 Y > M3 Y: 1.8 [s]
M2 Y > M3 Y: 1.79 [s]
M3 Y > M3 Y: 1.7 [s]
Displacement [rad/rtHz]
Time [s]
6
4
2
0
-2
-4
-6
0
1
2
3
4
5
6
7
8
9
10
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

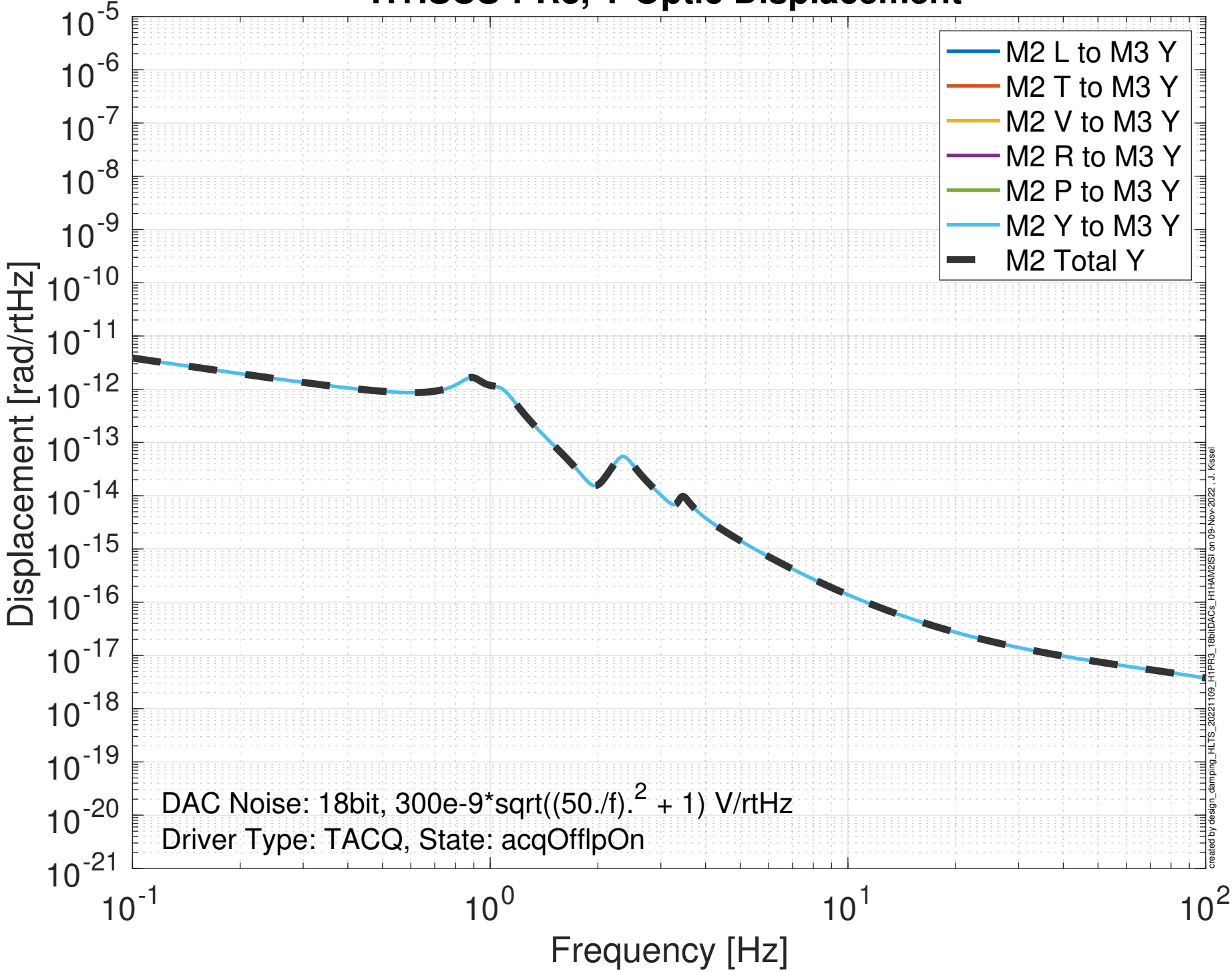

Projected Sus. Point > Optic Seismic Noise Budget
H1:SUS-PR3, Y Optic Displacement
Displacment [rad/rtHz]
Frequency [Hz]
Sus. Point L to M3 Y
Sus. Point T to M3 Y
Sus. Point V to M3 Y
Sus. Point R to M3 Y
Sus. Point P to M3 Y
Sus. Point Y to M3 Y
Total Y
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel


Projected Top Mass Sensor > Optic Noise Budget
H1:SUS-PR3, Y Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
M1 L to M3 Y
M1 T to M3 Y
M1 V to M3 Y
M1 R to M3 Y
M1 P to M3 Y
M1 Y to M3 Y
Total Y
Raw Sensor Noise
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

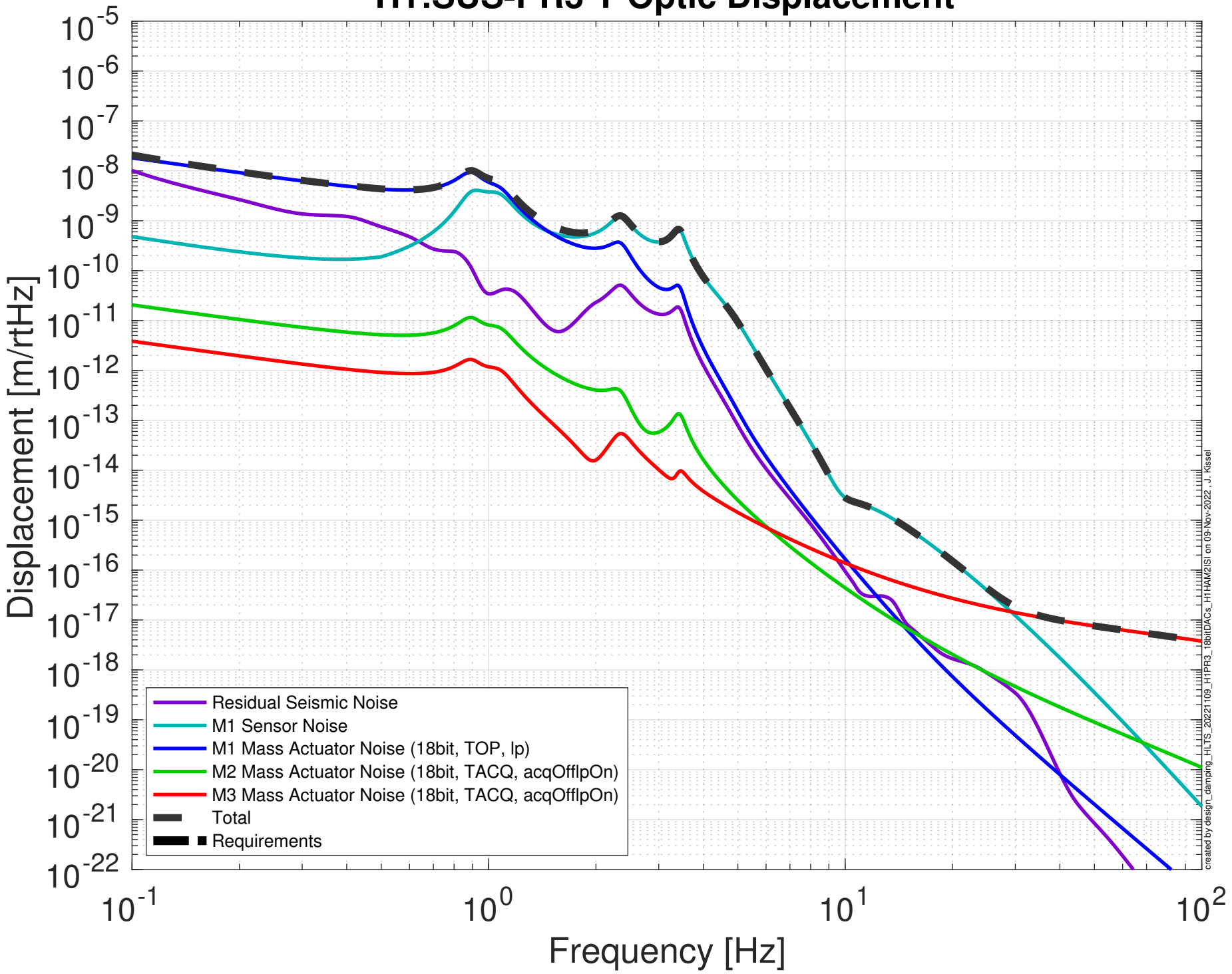

Global Control Transfer Functions to Optic
H1:SUS-PR3, Y
Magnitude [rad/N.m]
Frequency [Hz]
Undamped M1 Y to M3 Y
Undamped M2 Y to M3 Y
Undamped M3 Y to M3 Y
M1 Y to M3 Y
M2 Y to M3 Y
M3 Y to M3 Y
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

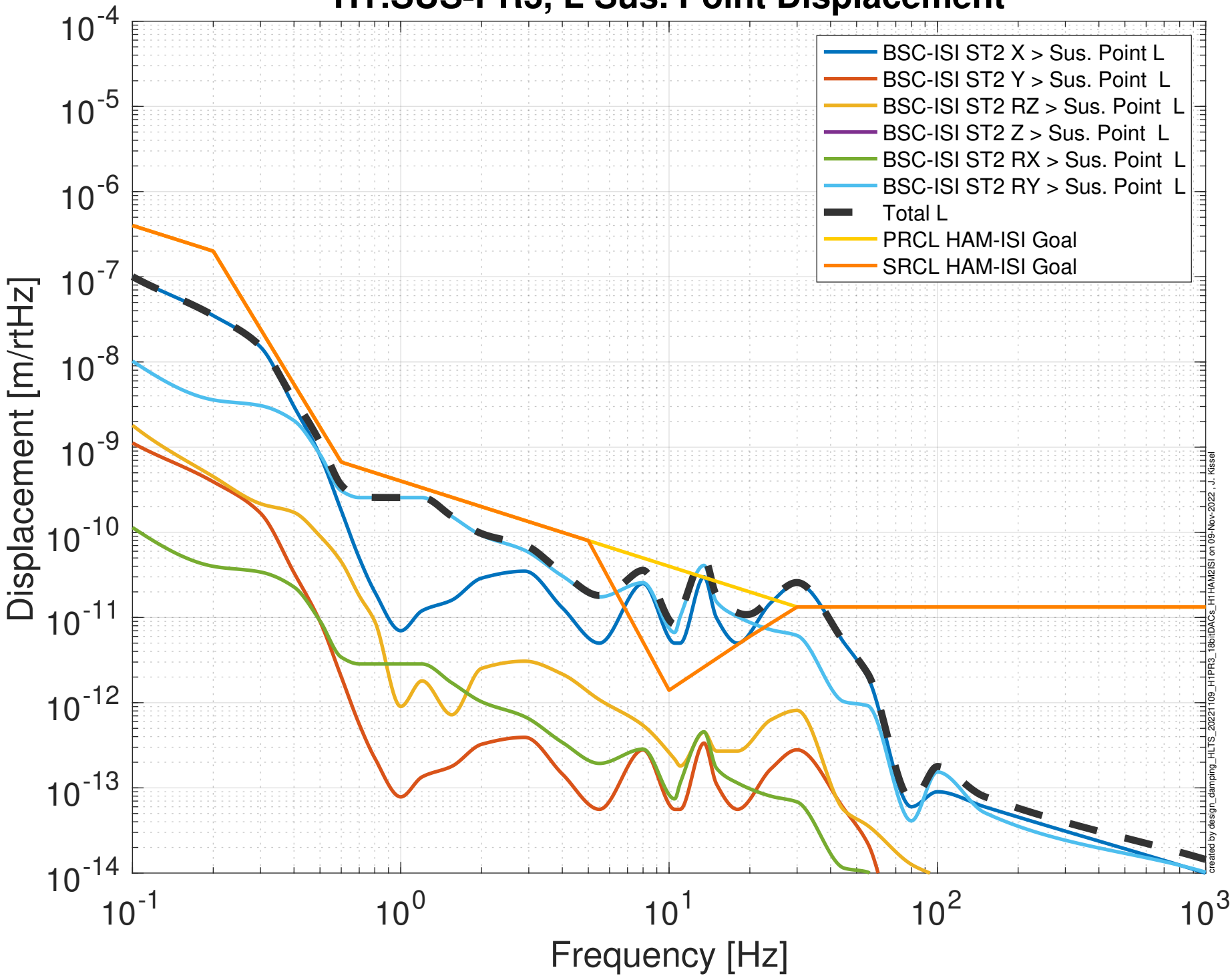

Projected M1 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, Y Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
M1 L to M3 Y
M1 T to M3 Y
M1 V to M3 Y
M1 R to M3 Y
M1 P to M3 Y
M1 Y to M3 Y
M1 Total Y
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TOP, State: lp
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

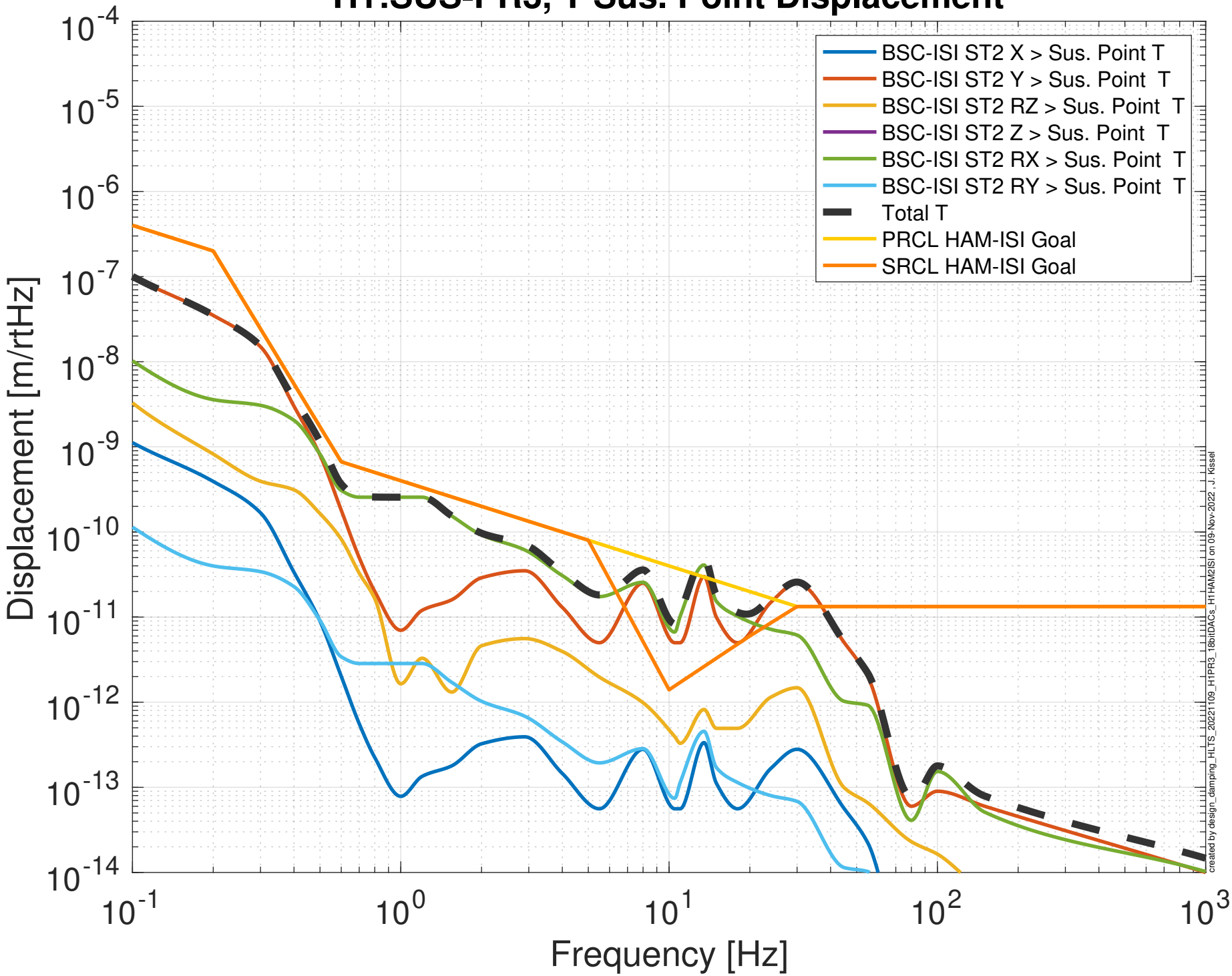

Projected M2 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, Y Optic Displacement
M2 L to M3 Y
M2 T to M3 Y
M2 V to M3 Y
M2 R to M3 Y
M2 P to M3 Y
M2 Y to M3 Y
M2 Total Y
Displacement [rad/rtHz]
Frequency [Hz]
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TACQ, State: acqOfflpOn
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

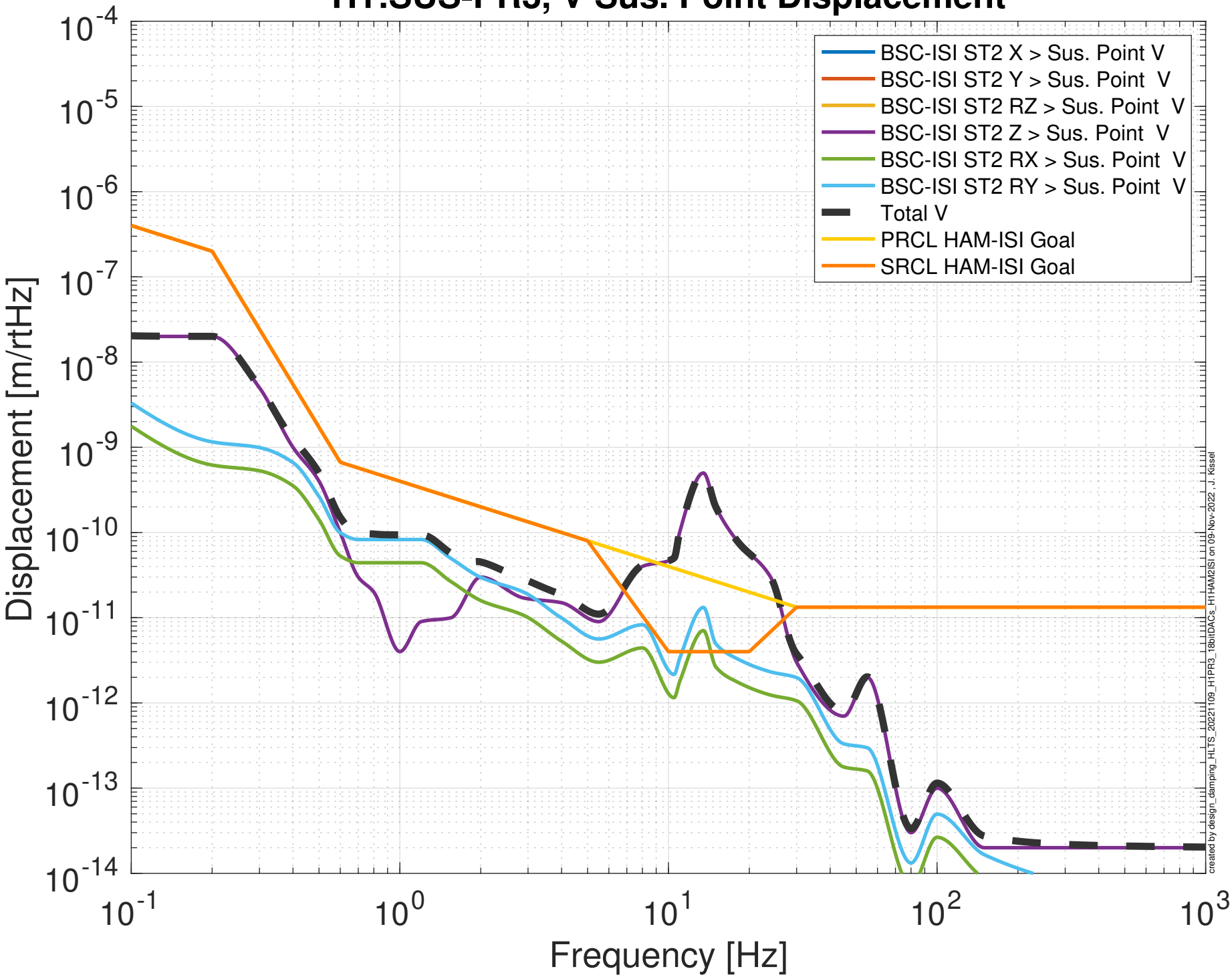

Projected M3 Mass Actuator > Optic Noise Budget
H1:SUS-PR3, Y Optic Displacement
M2 L to M3 Y
M2 T to M3 Y
M2 V to M3 Y
M2 R to M3 Y
M2 P to M3 Y
M2 Y to M3 Y
M2 Total Y
Displacement [rad/rtHz]
Frequency [Hz]
DAC Noise: 18bit, 300e-9*sqrt((50./f).^2 + 1) V/rtHz
Driver Type: TACQ, State: acqOfflpOn
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

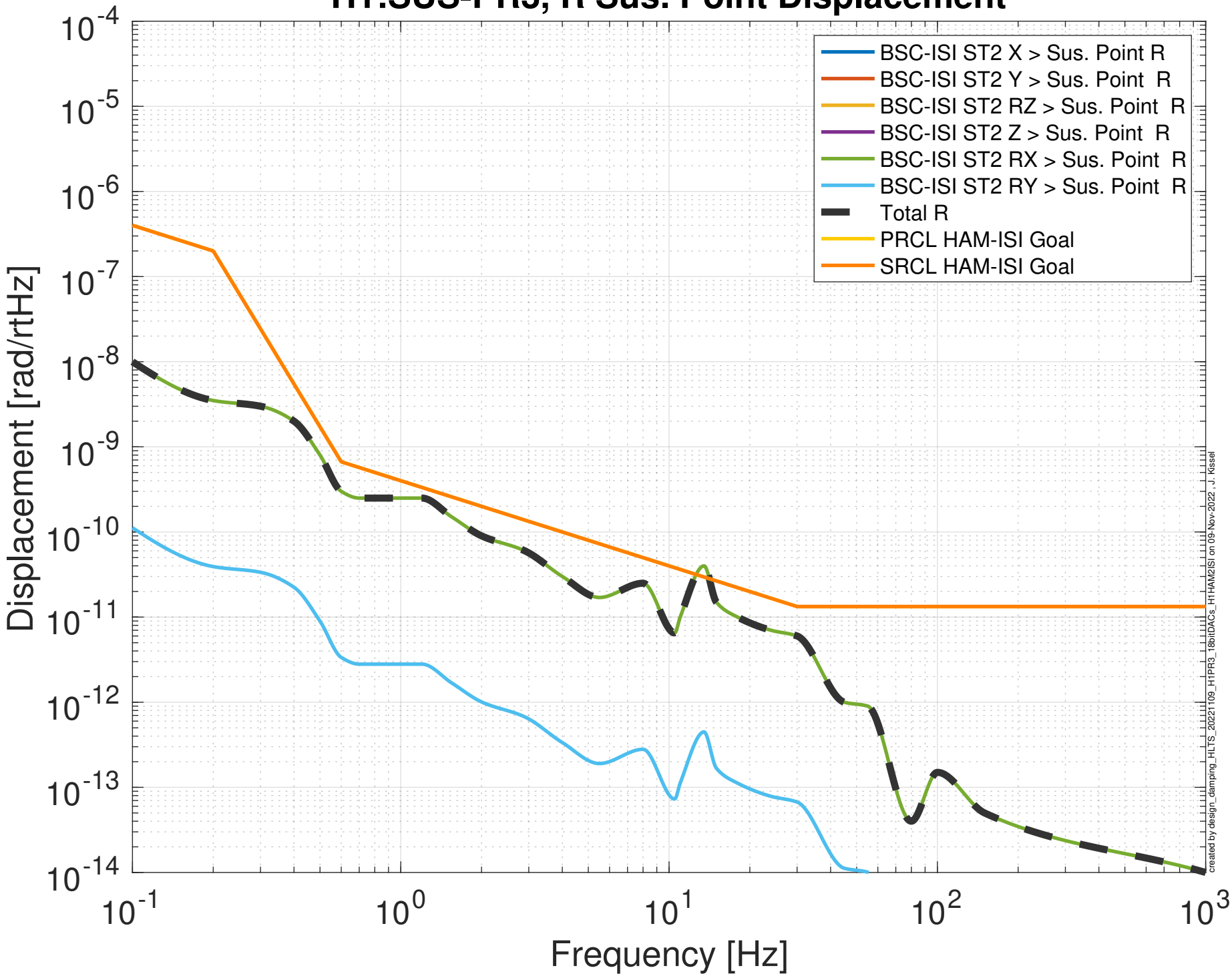
Damping Loop Performance
H1:SUS-PR3 Y Optic Displacement

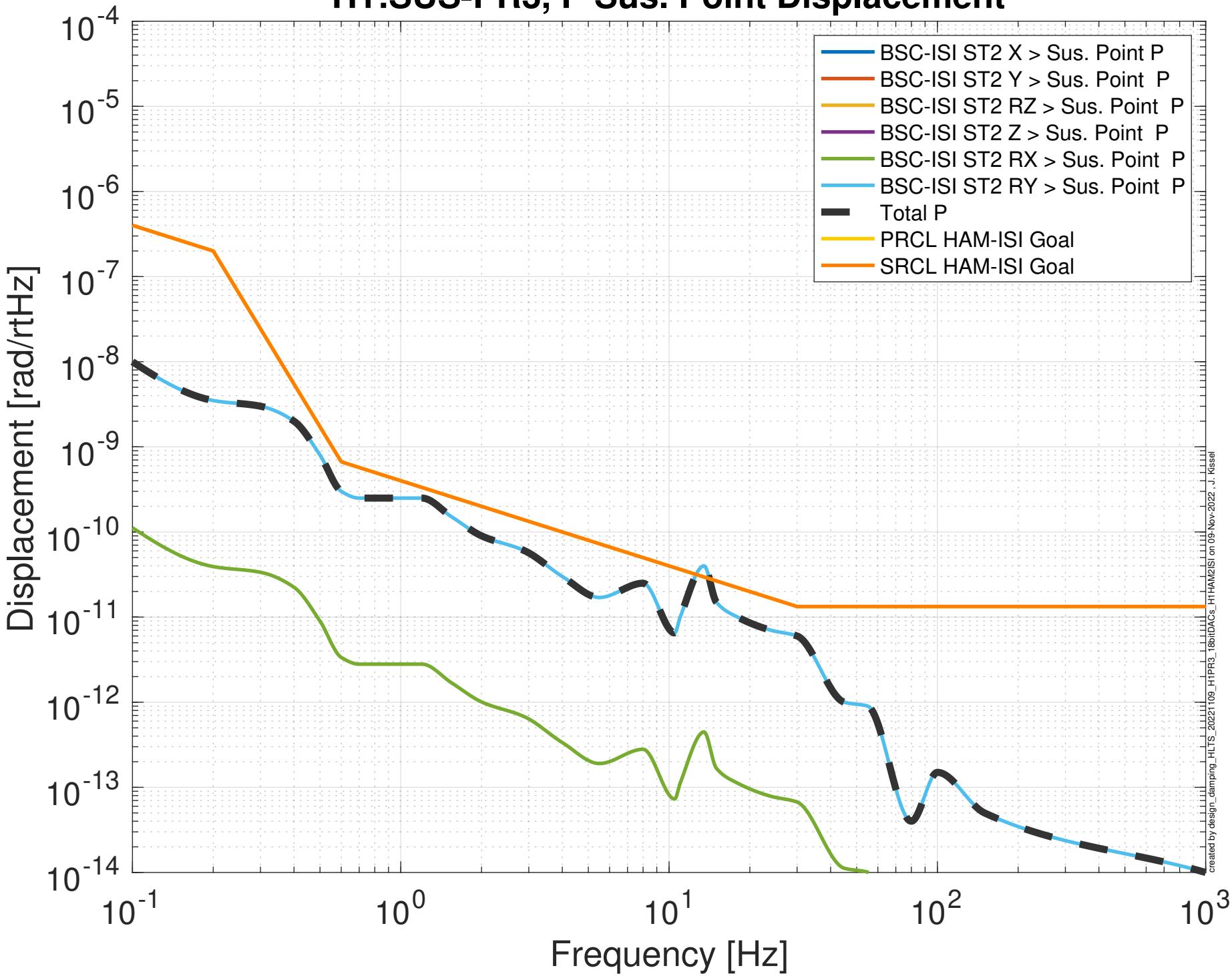



Projected ISI Seismic Noise Budget
H1:SUS-PR3, L Sus. Point Displacement
BSC-ISI ST2 X > Sus. Point L
BSC-ISI ST2 Y > Sus. Point L
BSC-ISI ST2 RZ > Sus. Point L
BSC-ISI ST2 Z > Sus. Point L
BSC-ISI ST2 RX > Sus. Point L
BSC-ISI ST2 RY > Sus. Point L
Total L
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
Displacement [m/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

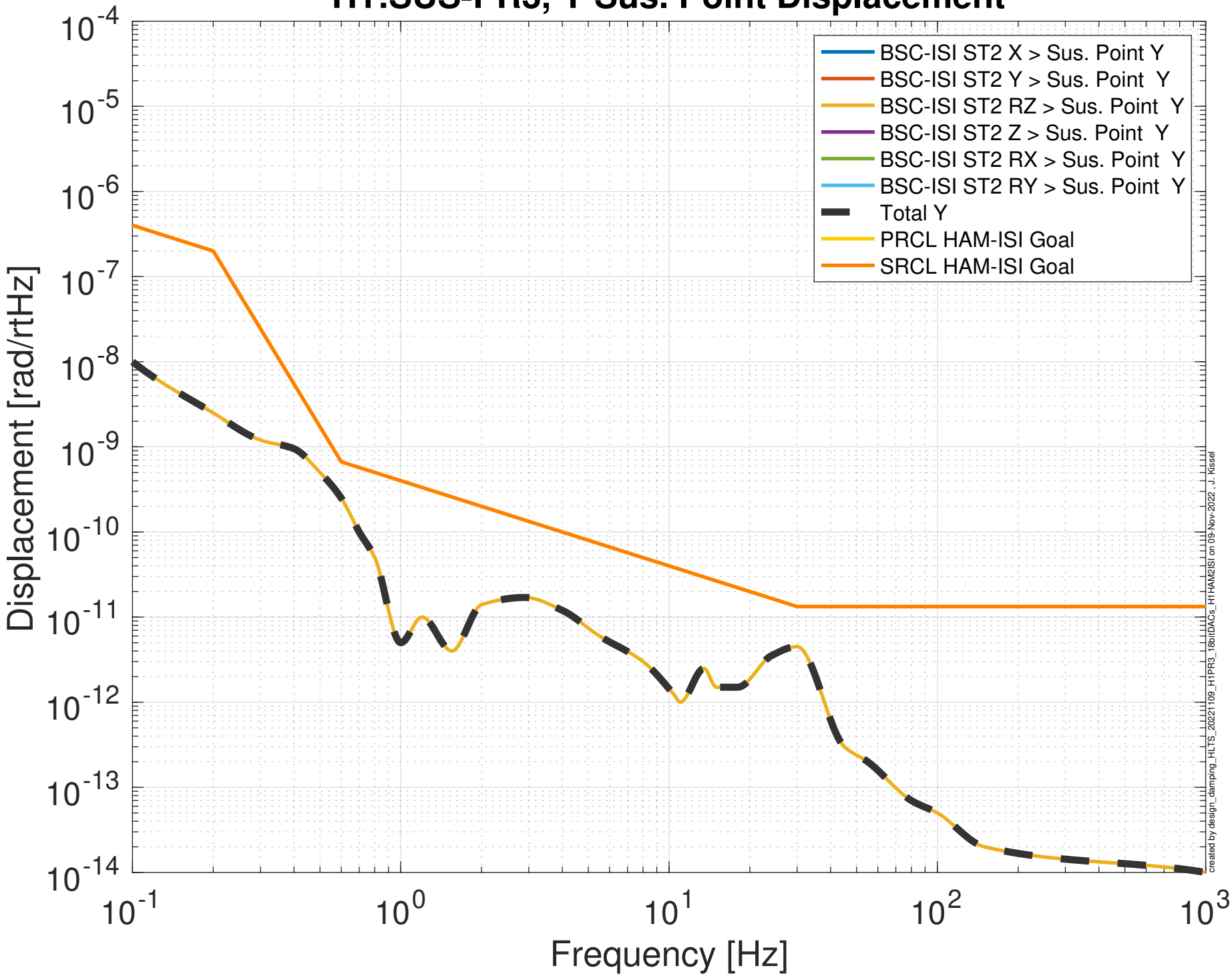

Projected ISI Seismic Noise Budget
H1:SUS-PR3, T Sus. Point Displacement
BSC-ISI ST2 X > Sus. Point T
BSC-ISI ST2 Y > Sus. Point T
BSC-ISI ST2 RZ > Sus. Point T
BSC-ISI ST2 Z > Sus. Point T
BSC-ISI ST2 RX > Sus. Point T
BSC-ISI ST2 RY > Sus. Point T
Total T
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
Displacement [m/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

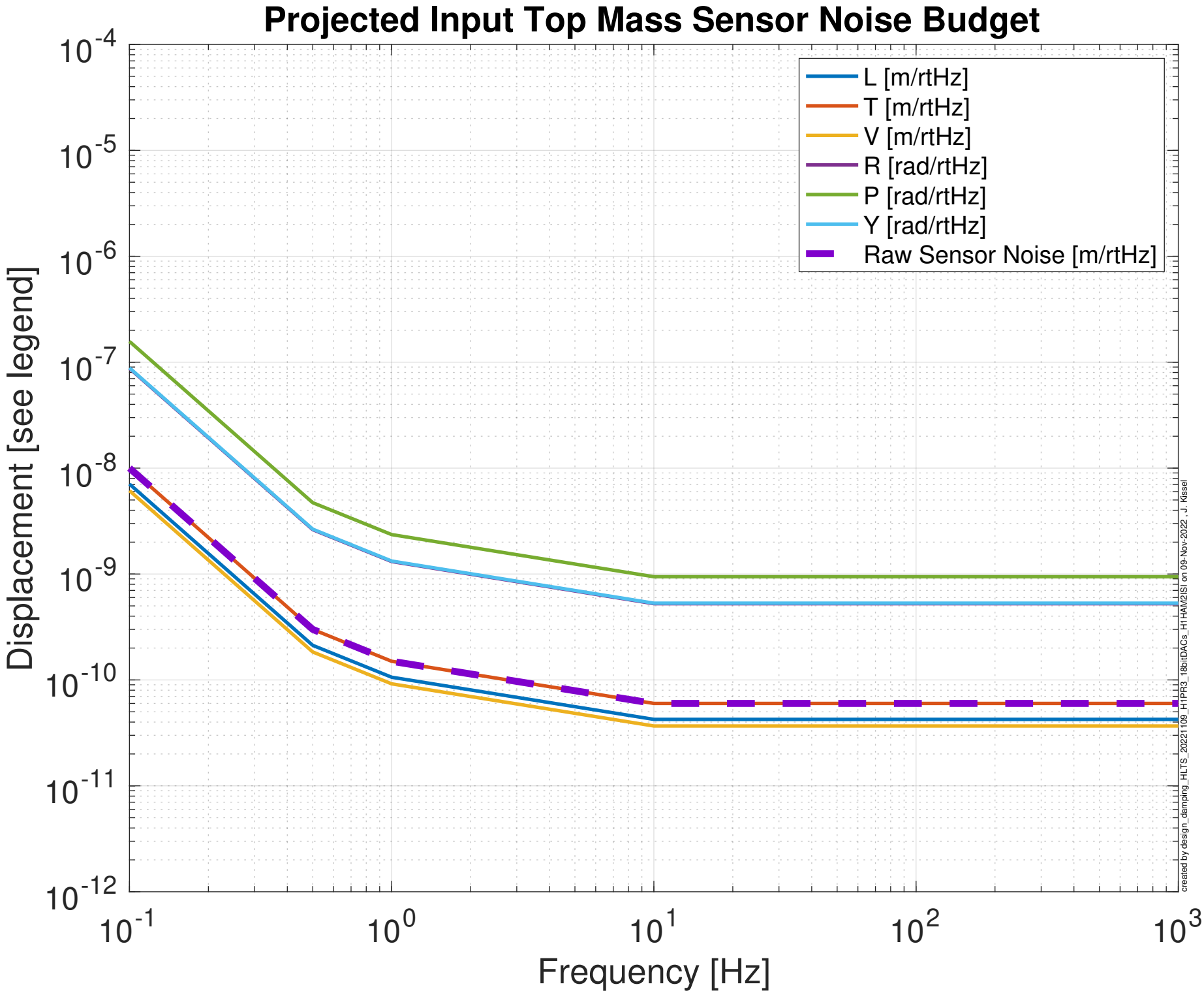

Projected ISI Seismic Noise Budget
H1:SUS-PR3, V Sus. Point Displacement
BSC-ISI ST2 X > Sus. Point V
BSC-ISI ST2 Y > Sus. Point V
BSC-ISI ST2 RZ > Sus. Point V
BSC-ISI ST2 Z > Sus. Point V
BSC-ISI ST2 RX > Sus. Point V
BSC-ISI ST2 RY > Sus. Point V
Total V
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
Displacement [m/rtHz]
Frequency [Hz]
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022, J. Kissel


Projected ISI Seismic Noise Budget
H1:SUS-PR3, R Sus. Point Displacement
Displacement [rad/rtHz]
Frequency [Hz]
BSC-ISI ST2 X > Sus. Point R
BSC-ISI ST2 Y > Sus. Point R
BSC-ISI ST2 RZ > Sus. Point R
BSC-ISI ST2 Z > Sus. Point R
BSC-ISI ST2 RX > Sus. Point R
BSC-ISI ST2 RY > Sus. Point R
Total R
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022, J. Kissel


Projected ISI Seismic Noise Budget
H1:SUS-PR3, P Sus. Point Displacement
Displacement [rad/rtHz]
Frequency [Hz]
BSC-ISI ST2 X > Sus. Point P
BSC-ISI ST2 Y > Sus. Point P
BSC-ISI ST2 RZ > Sus. Point P
BSC-ISI ST2 Z > Sus. Point P
BSC-ISI ST2 RX > Sus. Point P
BSC-ISI ST2 RY > Sus. Point P
Total P
PRCL HAM-ISI Goal
SRCL HAM-ISI Goal
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel

Projected ISI Seismic Noise Budget
H1:SUS-PR3, Y Sus. Point Displacement




Projected Input Top Mass Sensor Noise Budget
L [m/rtHz]
T [m/rtHz]
V [m/rtHz]
R [rad/rtHz]
P [rad/rtHz]
Y [rad/rtHz]
Raw Sensor Noise [m/rtHz]
Displacement [see legend]
Frequency [Hz]
10^-4
10^-5
10^-6
10^-7
10^-8
10^-9
10^-10
10^-11
10^-12
10^-1
10^0
10^1
10^2
10^3
created by design_damping_HLTS_20221109_H1PR3_18bitDACs_H1HAM2ISI on 09-Nov-2022 , J. Kissel