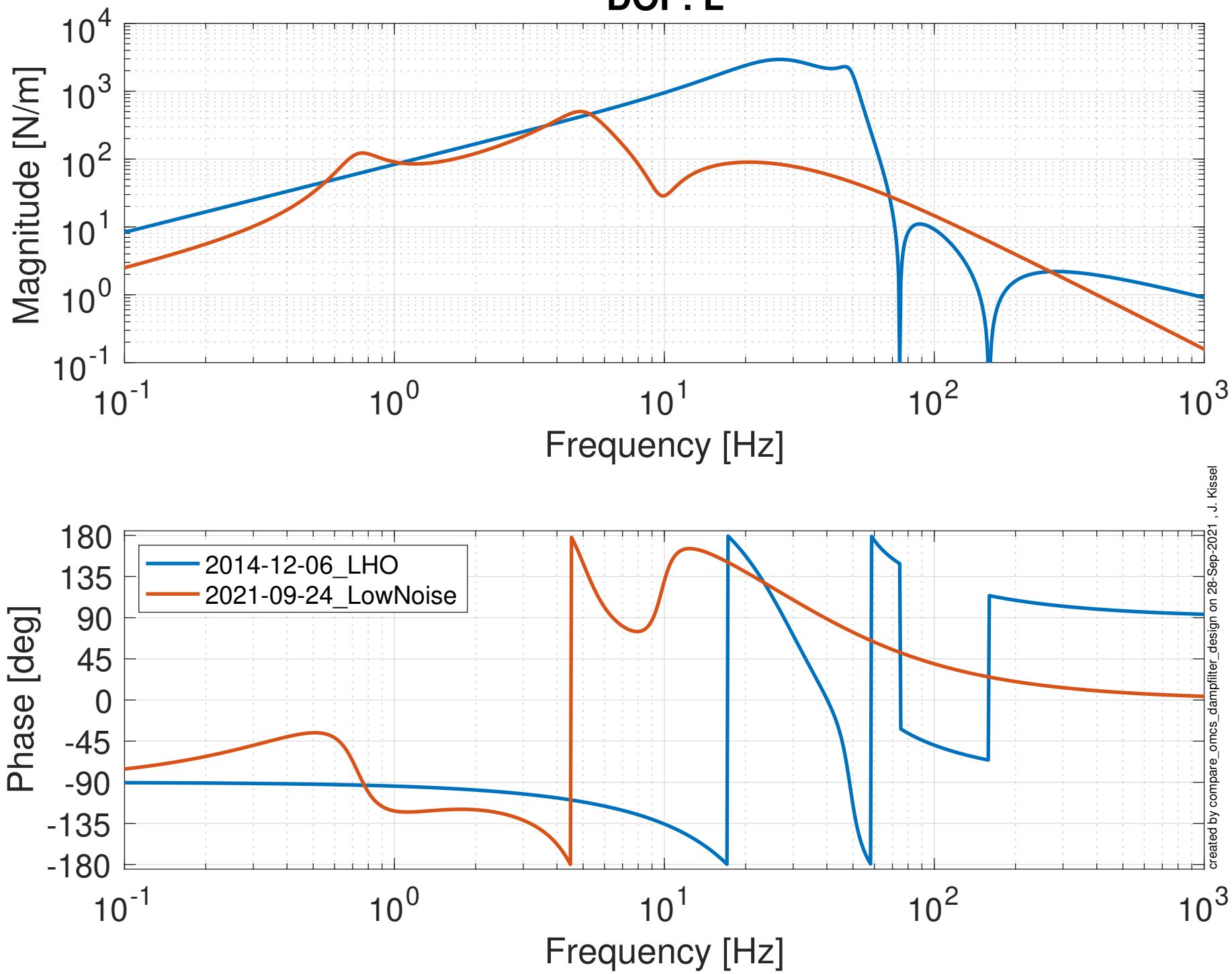
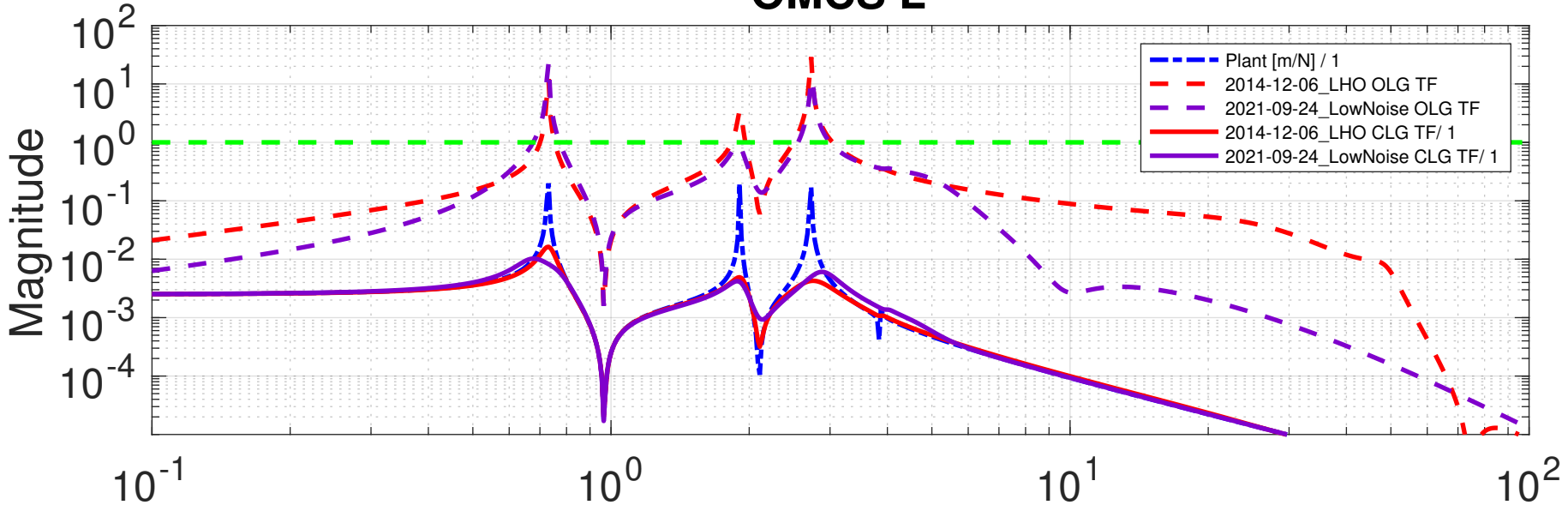
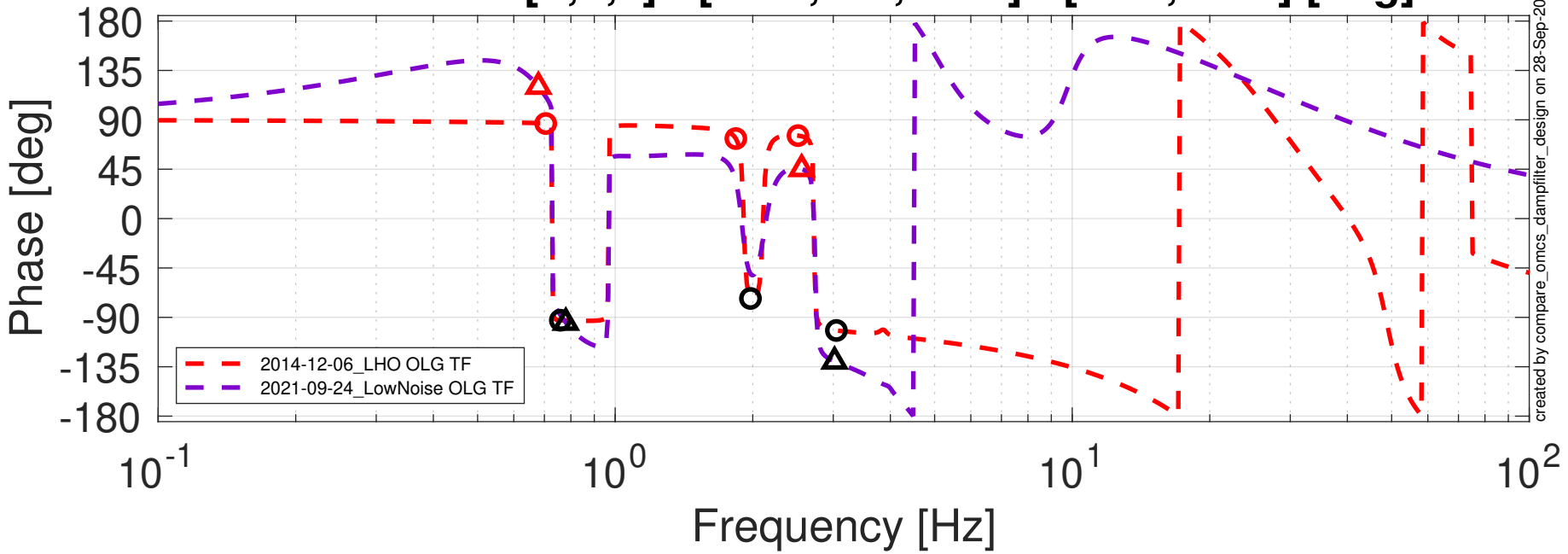
Calibrated Damping Filter Comparison
DOF: L

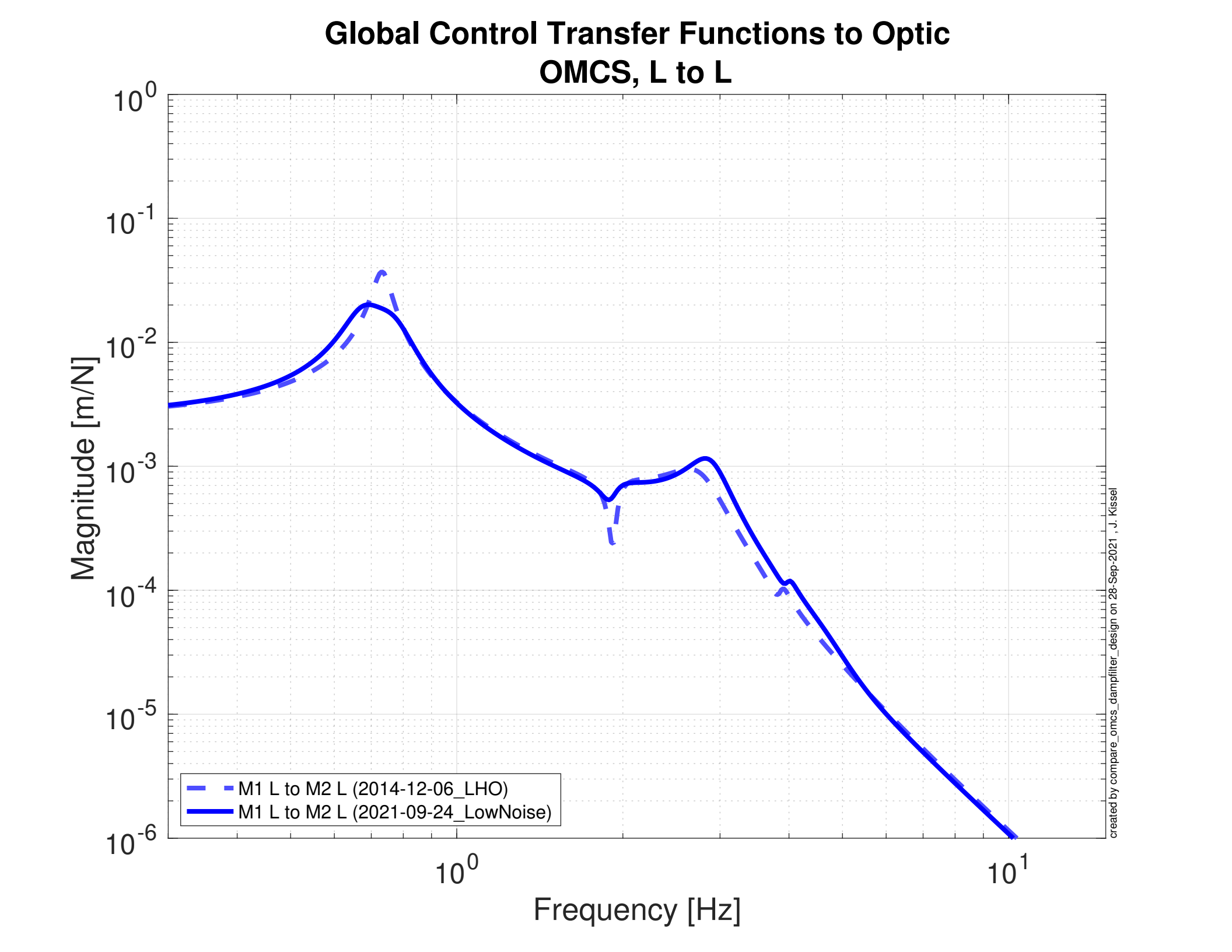


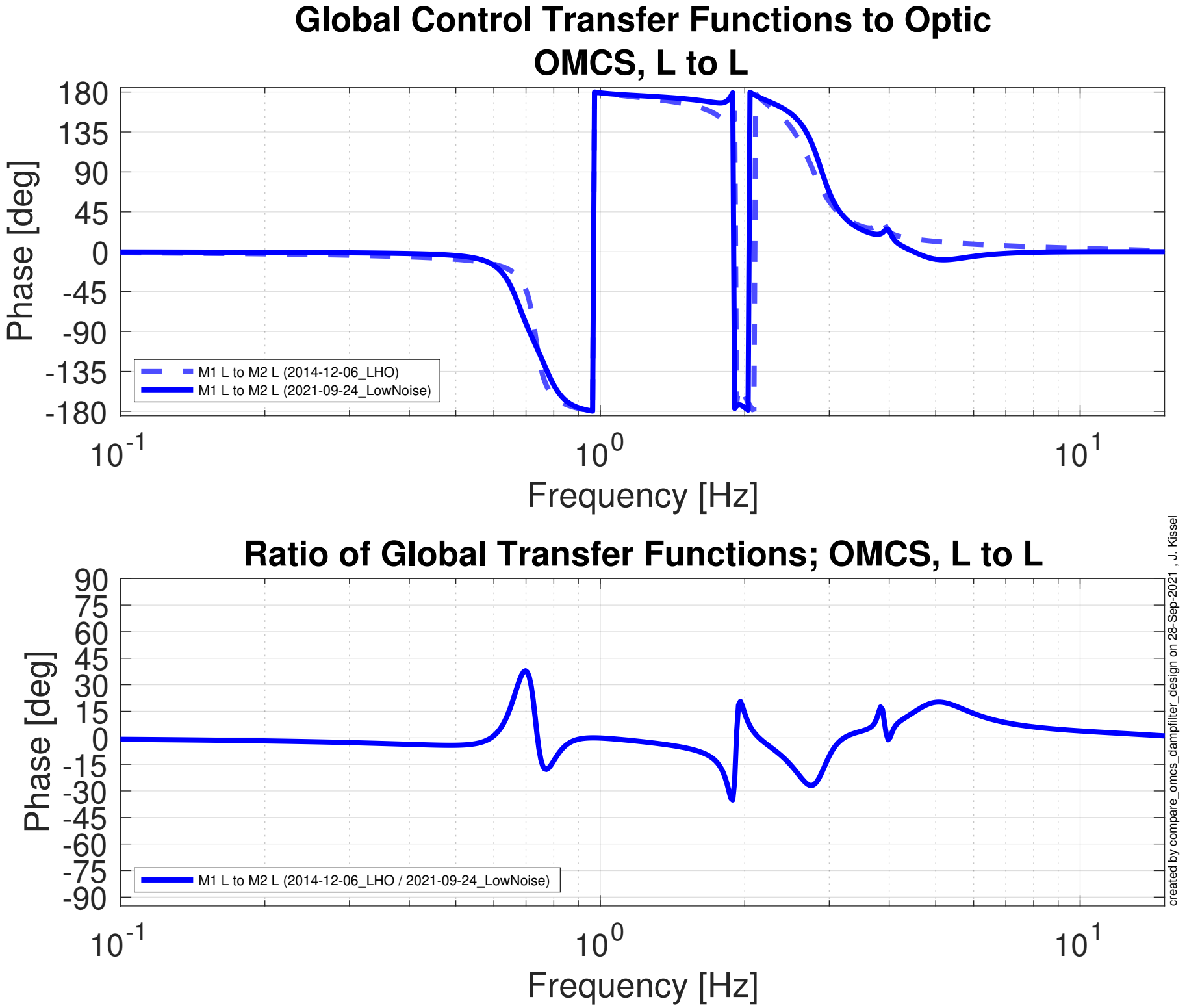
Damping Loop Design Comparison
OMCS L

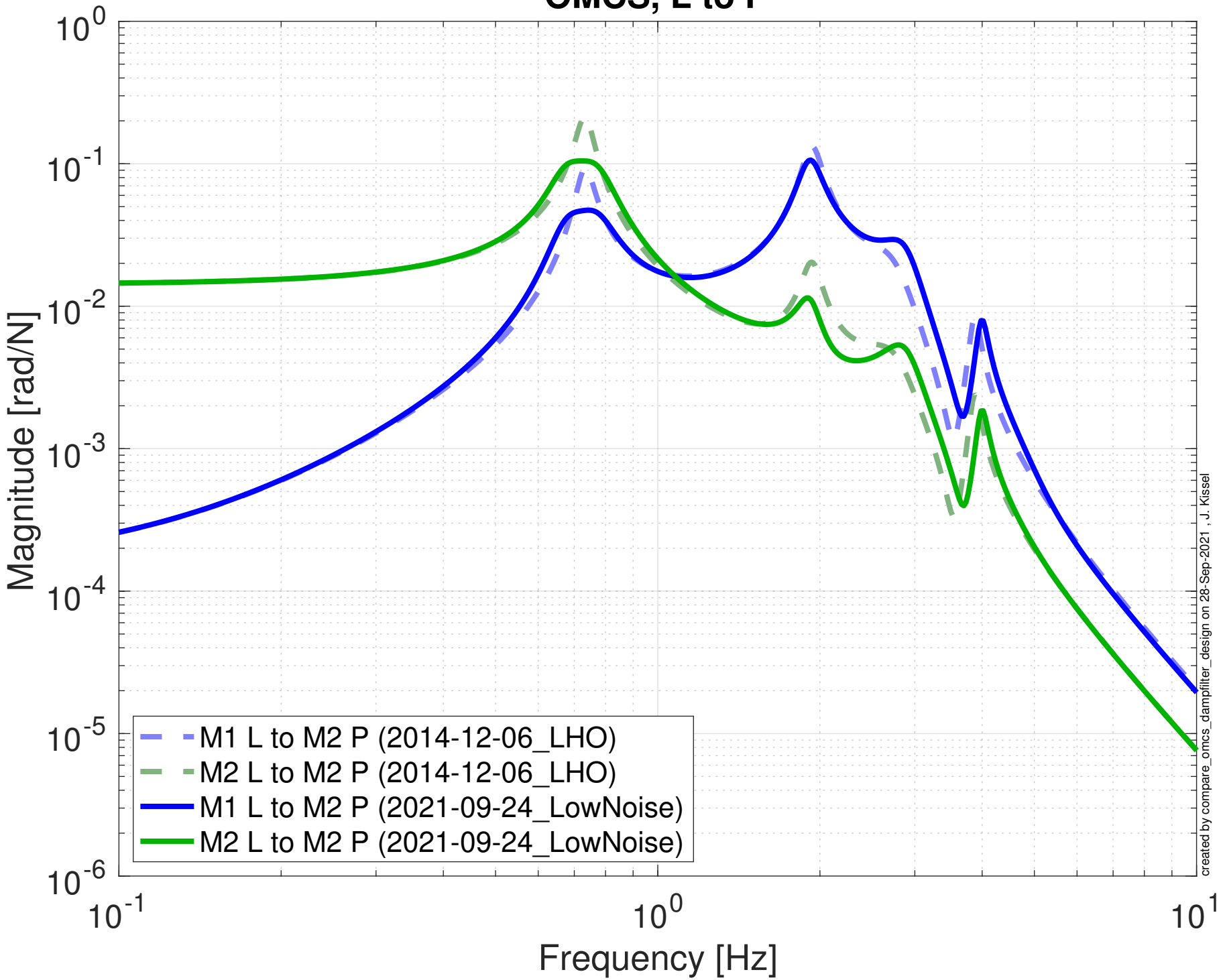


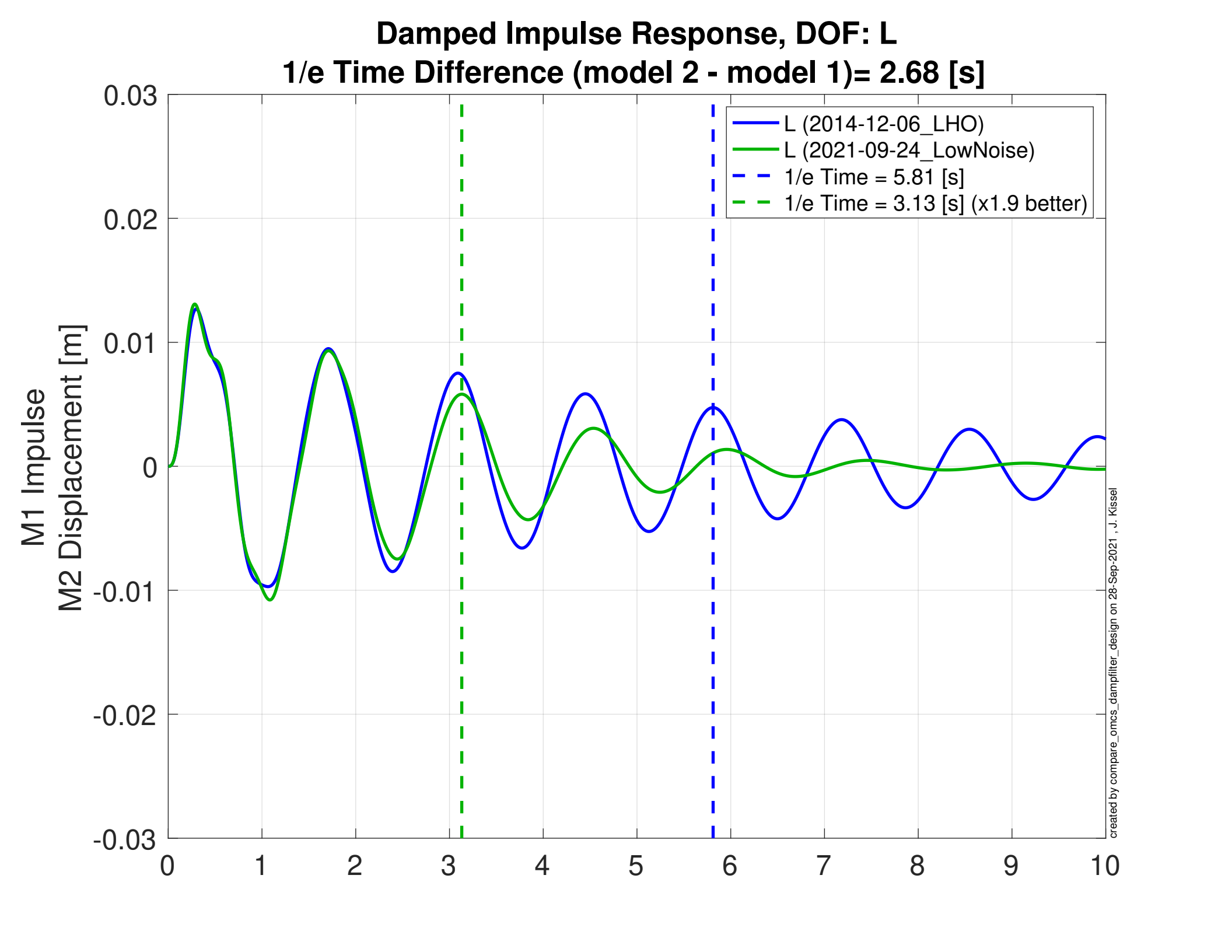
First LUGF [o,^,s] : [LHO, LN, LLO] : [93.4, 59.7] [deg]
Last UUGF [o,^,s] : [LHO, LN, LLO] : [78.1, 49.8] [deg]

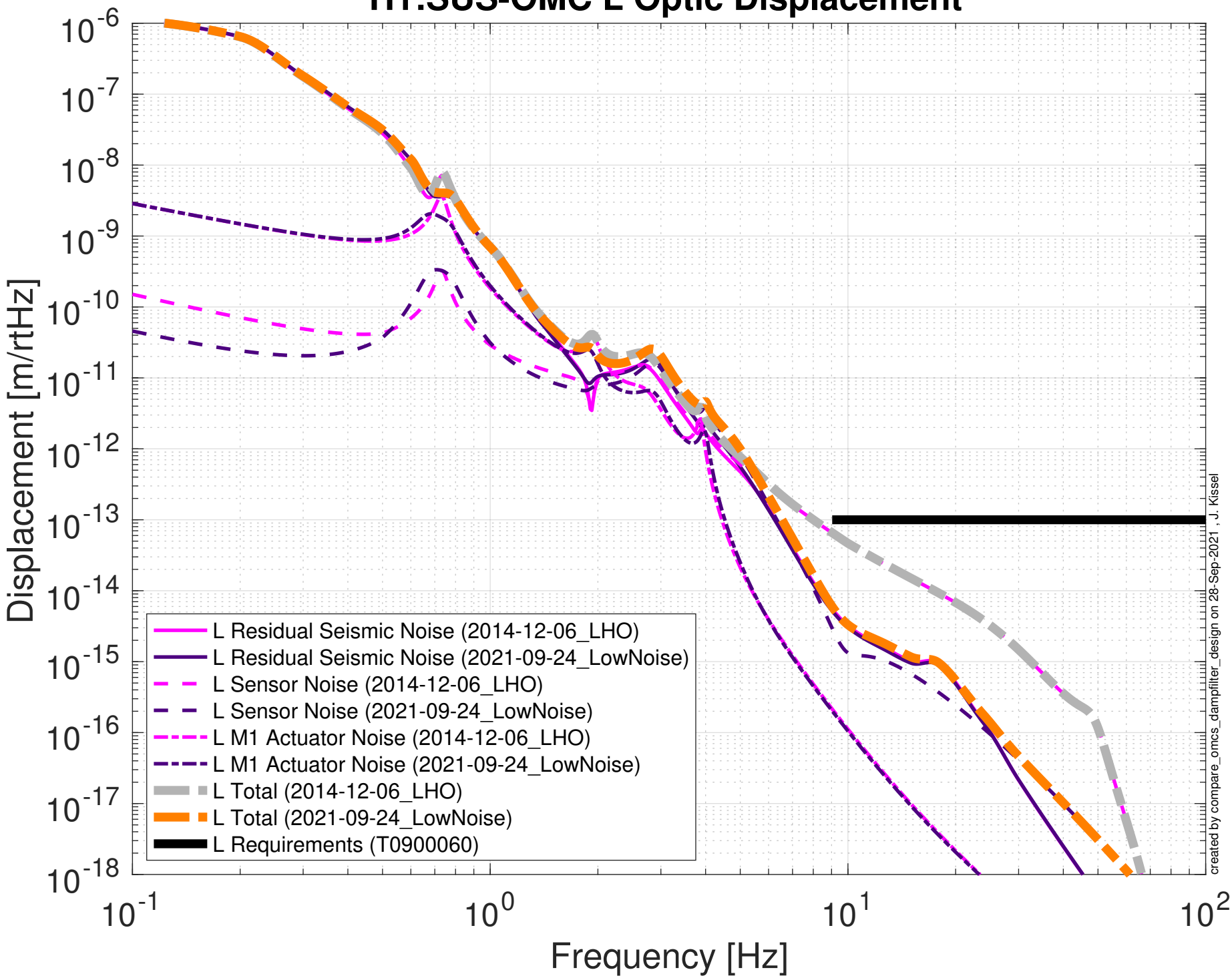


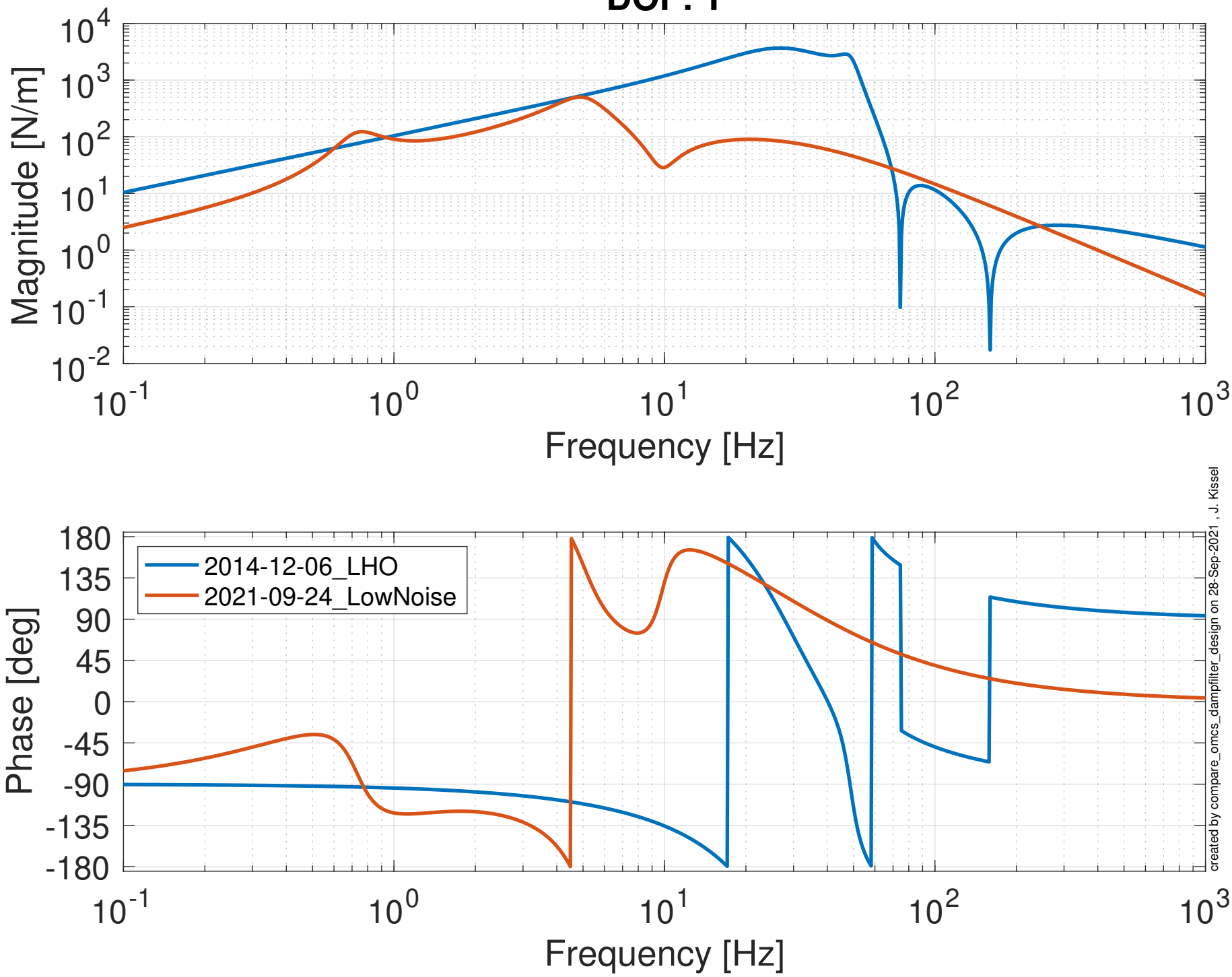

Global Control Transfer Functions to Optic
OMCS, L to L
Magnitude [m/N]
Frequency [Hz]
M1 L to M2 L (2014-12-06_LHO)
M1 L to M2 L (2021-09-24_LowNoise)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Global Control Transfer Functions to Optic
OMCS, L to L
Phase [deg]
180
135
90
45
0
-45
-90
-135
-180
M1 L to M2 L (2014-12-06_LHO)
M1 L to M2 L (2021-09-24_LowNoise)
10^-1
10^0
10^1
Frequency [Hz]
Ratio of Global Transfer Functions; OMCS, L to L
Phase [deg]
90
75
60
45
30
15
0
-15
-30
-45
-60
-75
-90
M1 L to M2 L (2014-12-06_LHO / 2021-09-24_LowNoise)
10^-1
10^0
10^1
Frequency [Hz]
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

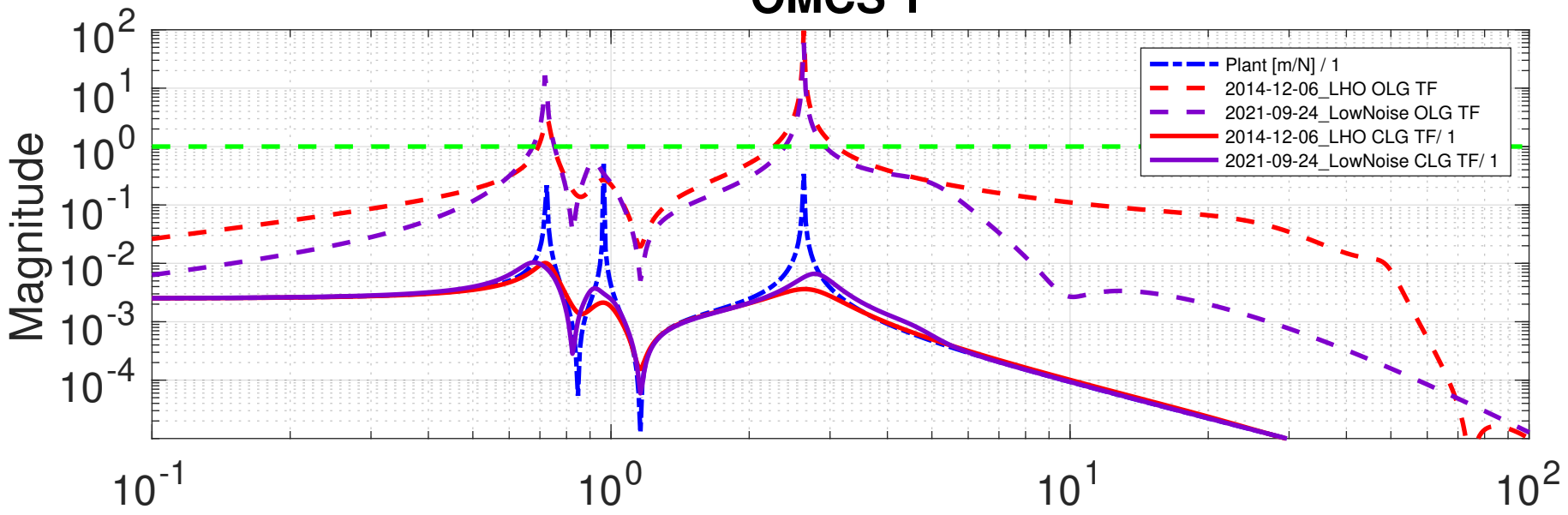

Global Control Transfer Functions to Optic
OMCS, L to P
Magnitude [rad/N]
Frequency [Hz]
M1 L to M2 P (2014-12-06_LHO)
M2 L to M2 P (2014-12-06_LHO)
M1 L to M2 P (2021-09-24_LowNoise)
M2 L to M2 P (2021-09-24_LowNoise)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Damped Impulse Response, DOF: L
1/e Time Difference (model 2 - model 1)= 2.68 [s]
L (2014-12-06_LHO)
L (2021-09-24_LowNoise)
1/e Time = 5.81 [s]
1/e Time = 3.13 [s] (x1.9 better)
M1 Impulse
M2 Displacement [m]
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
0
1
2
3
4
5
6
7
8
9
10
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

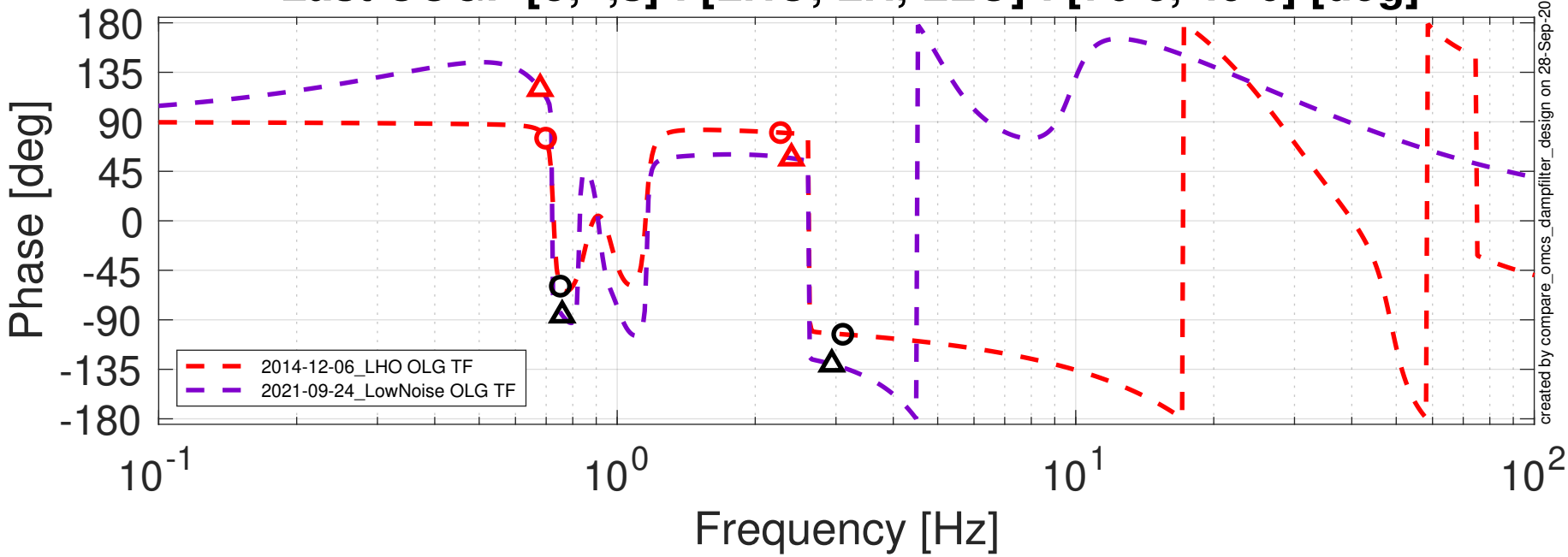

Damping Loop Performance Comparison
H1:SUS-OMC L Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
L Residual Seismic Noise (2014-12-06_LHO)
L Residual Seismic Noise (2021-09-24_LowNoise)
L Sensor Noise (2014-12-06_LHO)
L Sensor Noise (2021-09-24_LowNoise)
L M1 Actuator Noise (2014-12-06_LHO)
L M1 Actuator Noise (2021-09-24_LowNoise)
L Total (2014-12-06_LHO)
L Total (2021-09-24_LowNoise)
L Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

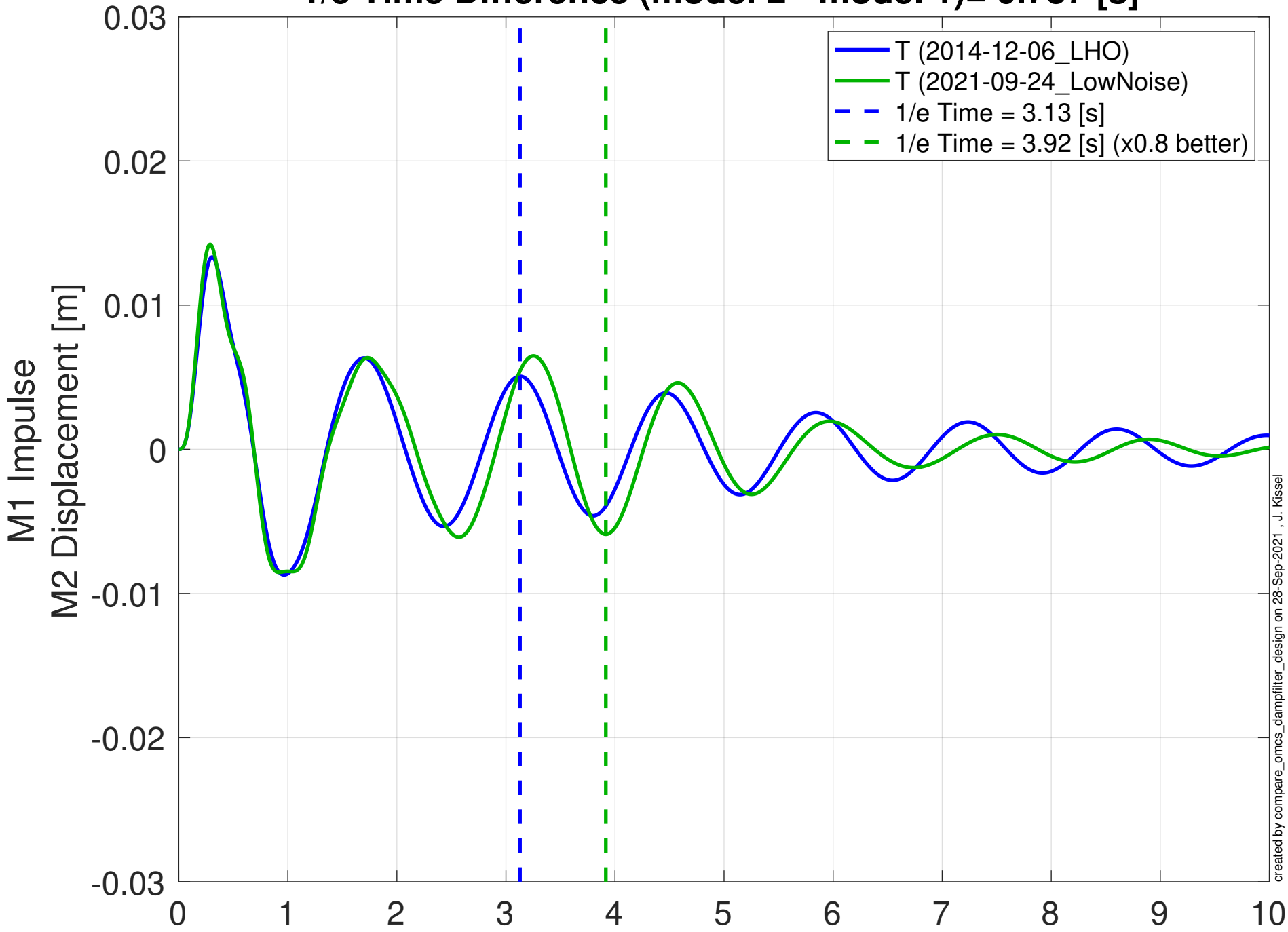

Calibrated Damping Filter Comparison
DOF: T
Magnitude [N/m]
Frequency [Hz]
Phase [deg]
Frequency [Hz]
2014-12-06_LHO
2021-09-24_LowNoise
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

Damping Loop Design Comparison
OMCS T

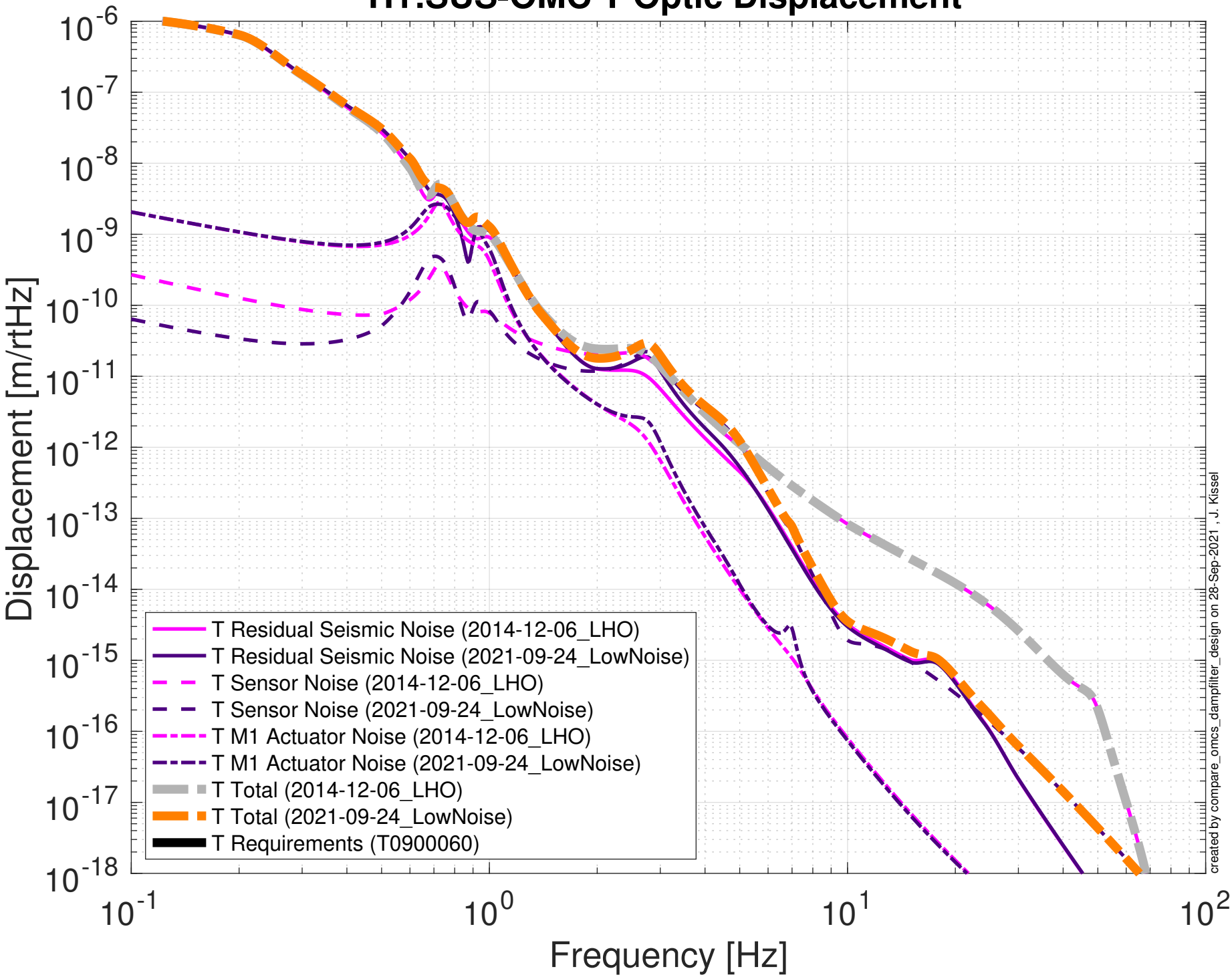


First LUGF [o,^,s] : [LHO, LN, LLO] : [105, 59.9] [deg]
Last UUGF [o,^,s] : [LHO, LN, LLO] : [76.8, 49.6] [deg]

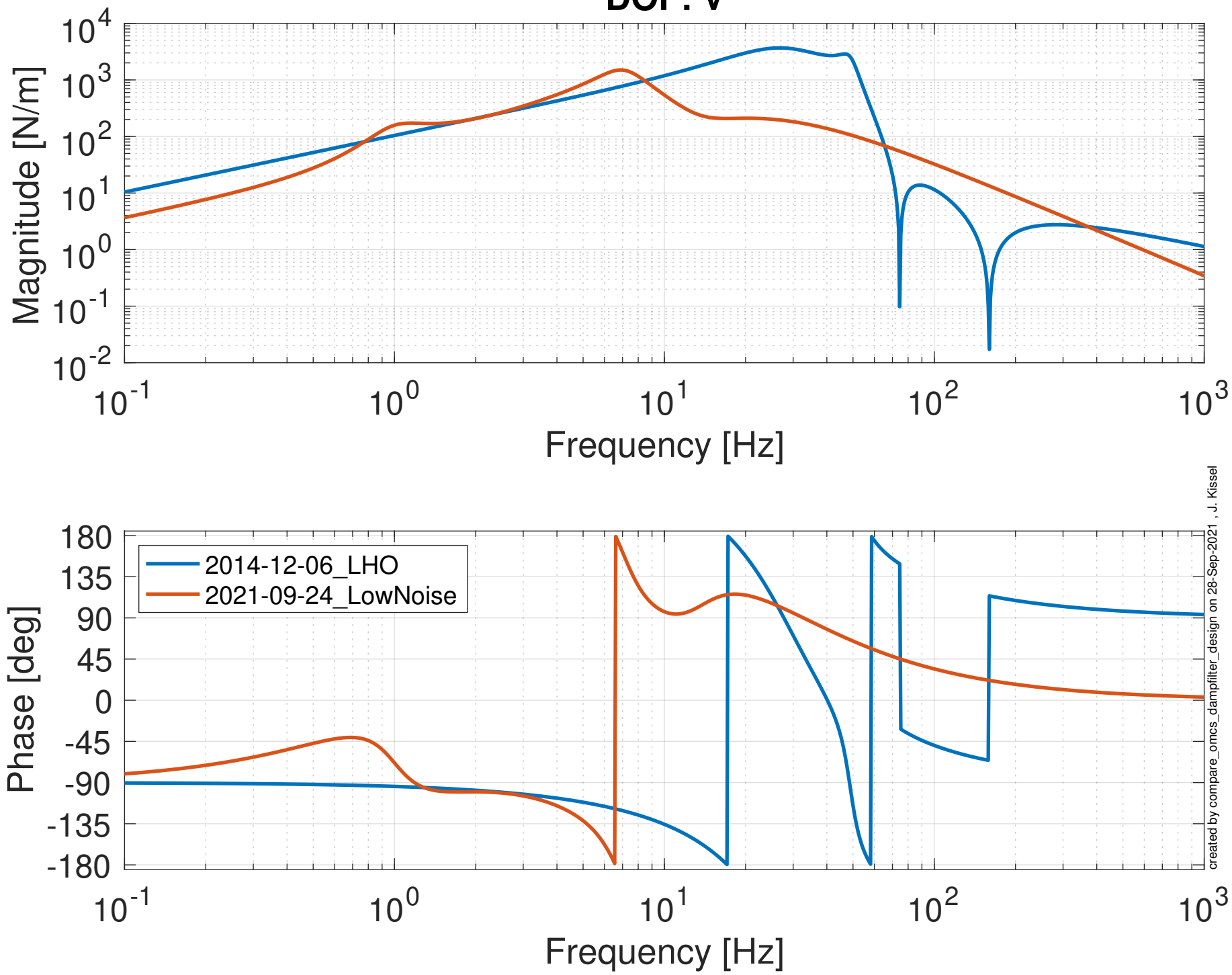



Damped Impulse Response, DOF: T
1/e Time Difference (model 2 - model 1)= 0.787 [s]
T (2014-12-06_LHO)
T (2021-09-24_LowNoise)
1/e Time = 3.13 [s]
1/e Time = 3.92 [s] (x0.8 better)
M1 Impulse
M2 Displacement [m]
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
0
1
2
3
4
5
6
7
8
9
10
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

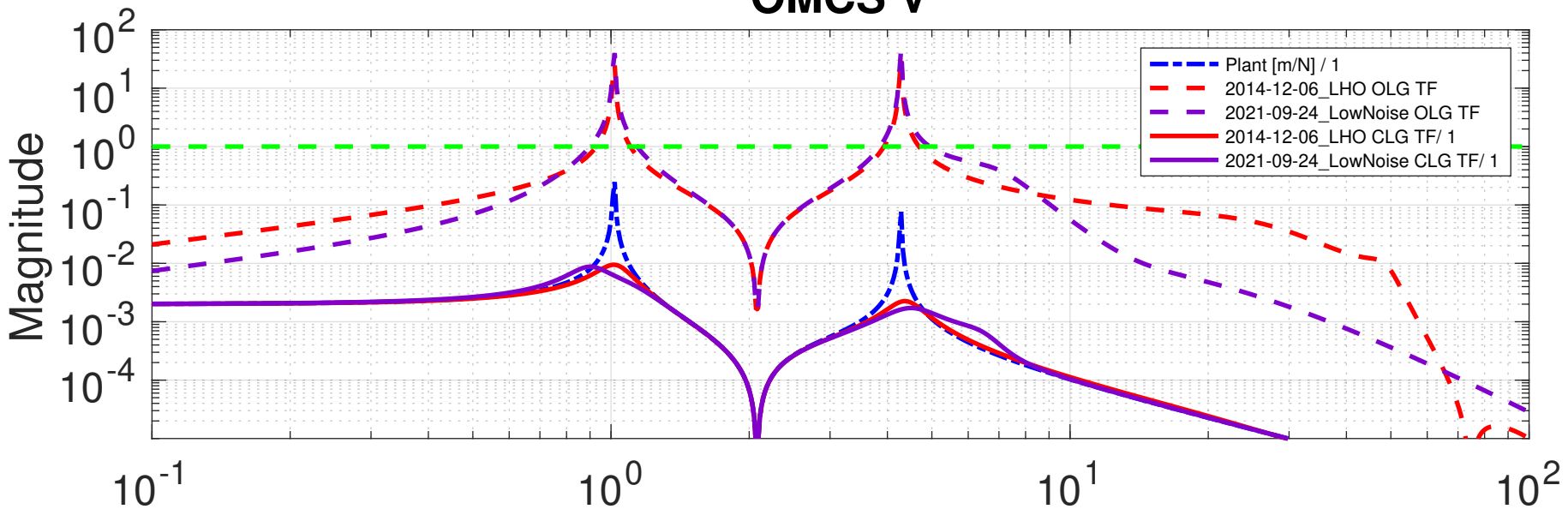
Damping Loop Performance Comparison
H1:SUS-OMC T Optic Displacement



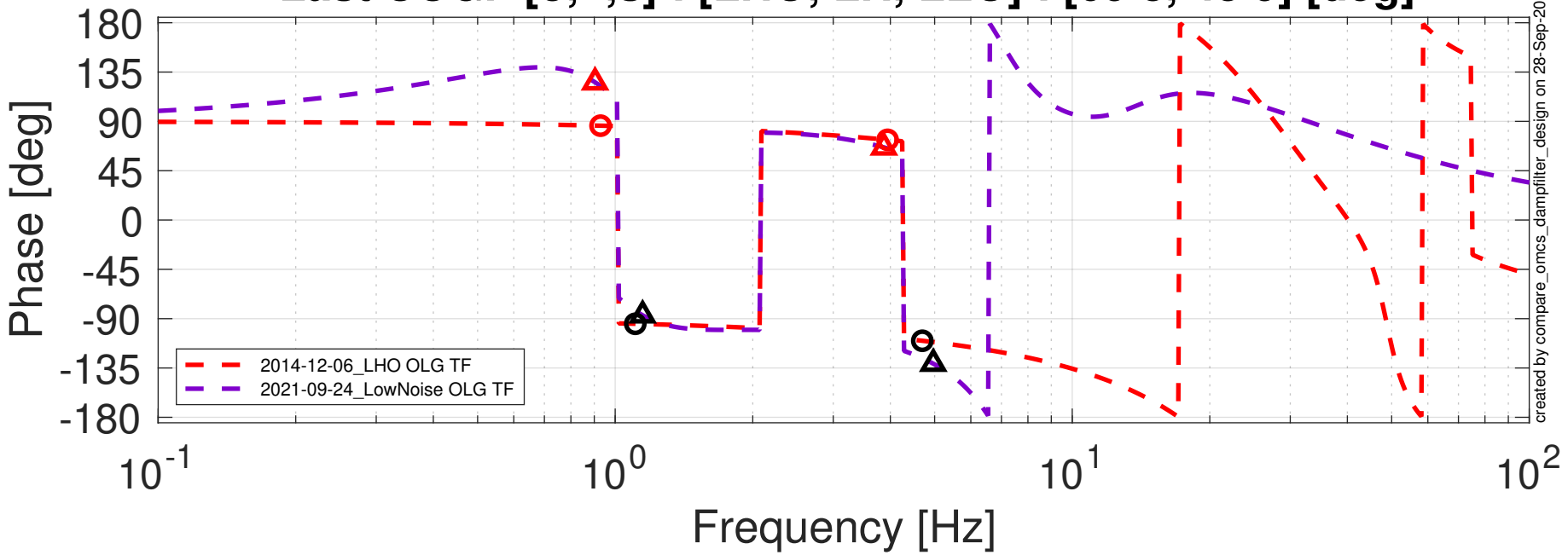
Calibrated Damping Filter Comparison
DOF: V

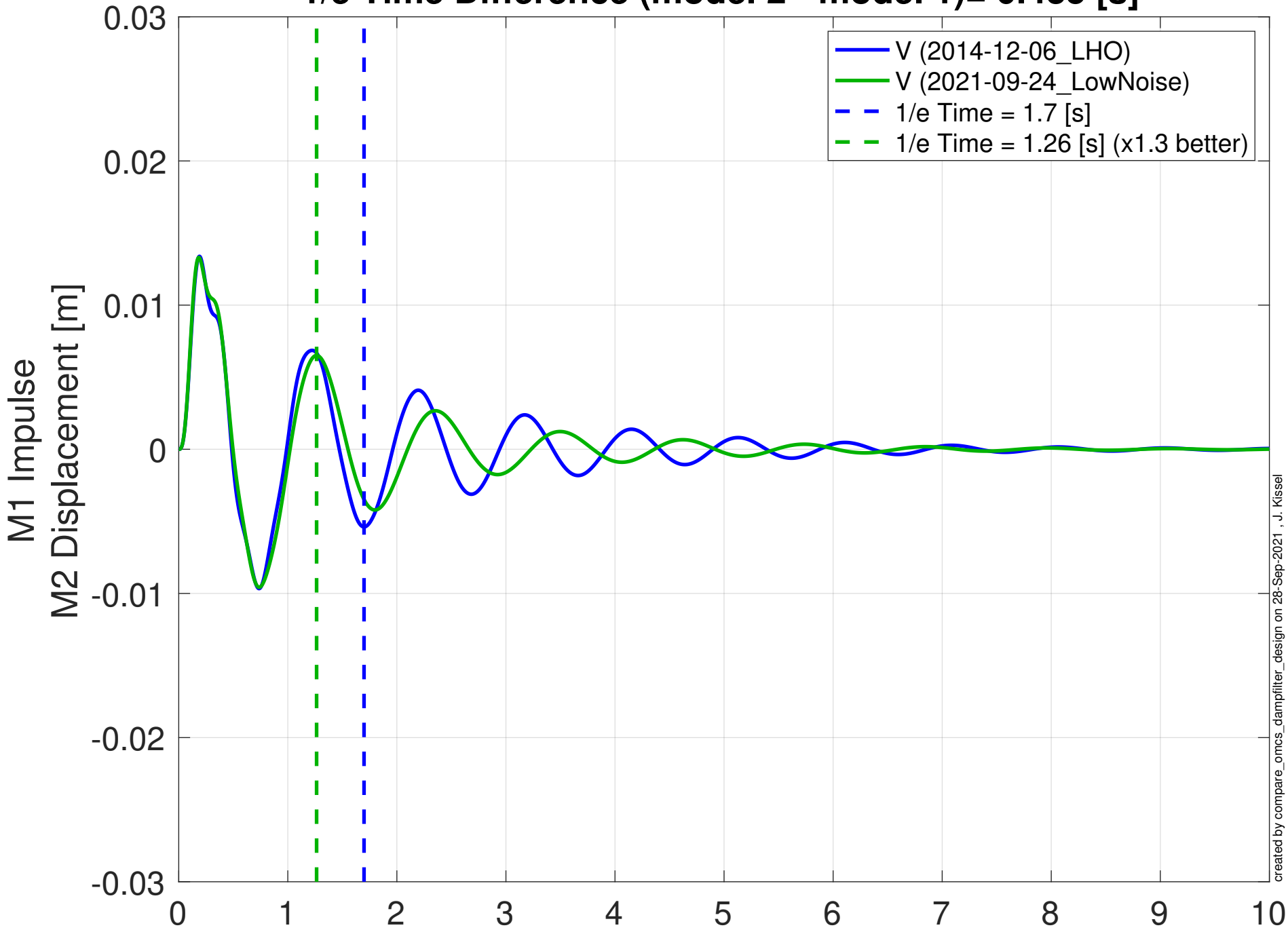


Damping Loop Design Comparison
OMCS V

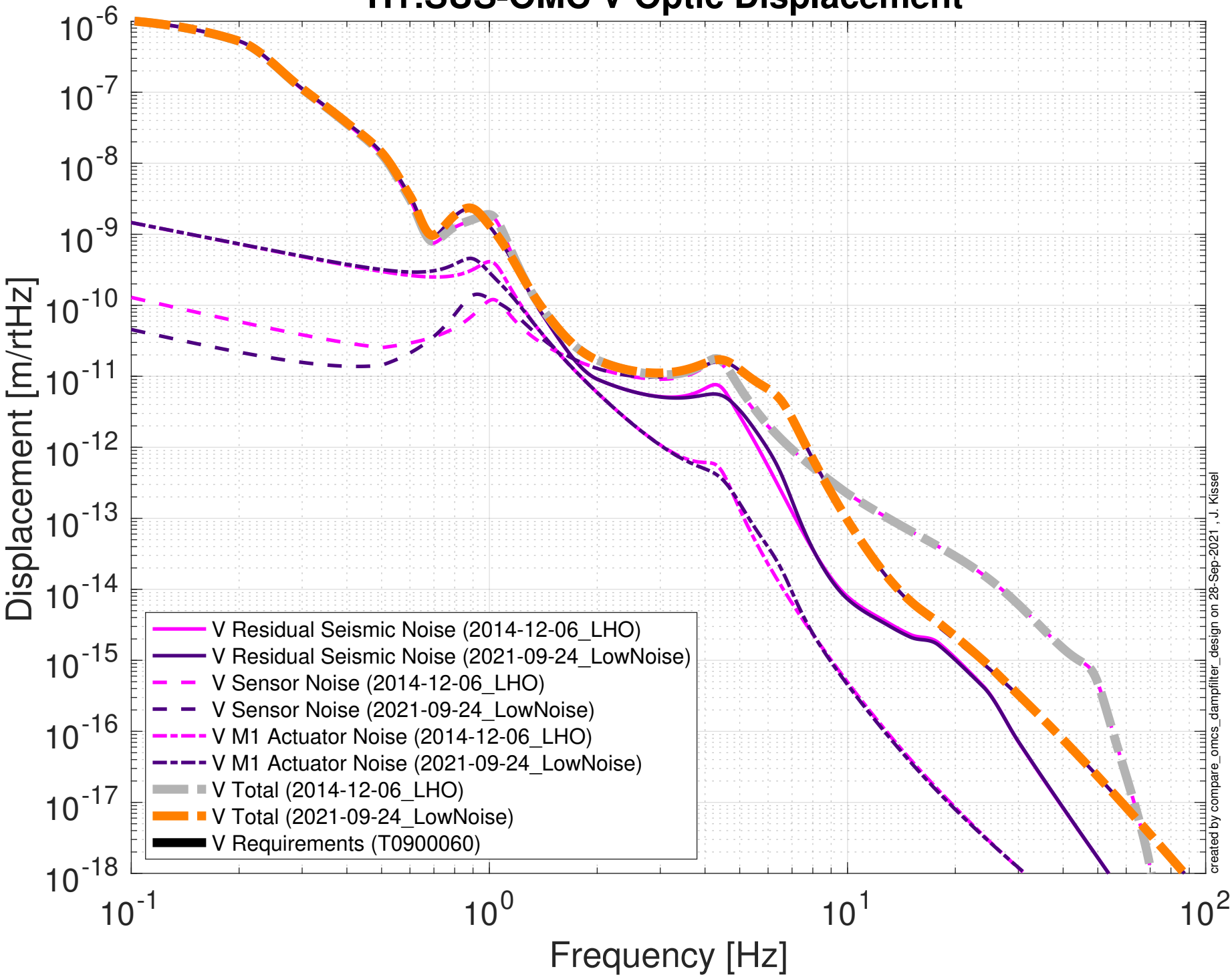


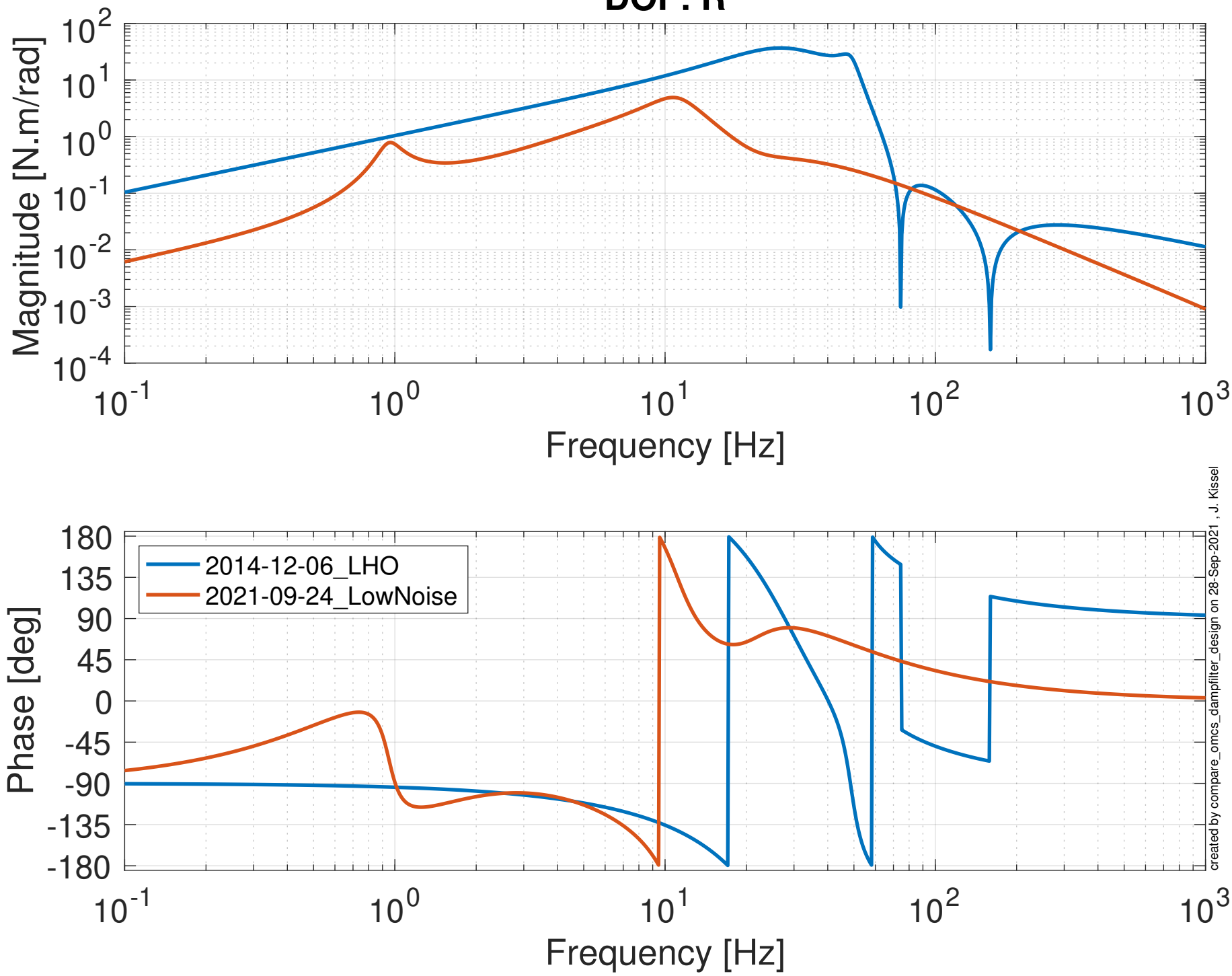
First LUGF [o,^,s] : [LHO, LN, LLO] : [93.9, 54.4] [deg]
Last UUGF [o,^,s] : [LHO, LN, LLO] : [69.8, 48.9] [deg]



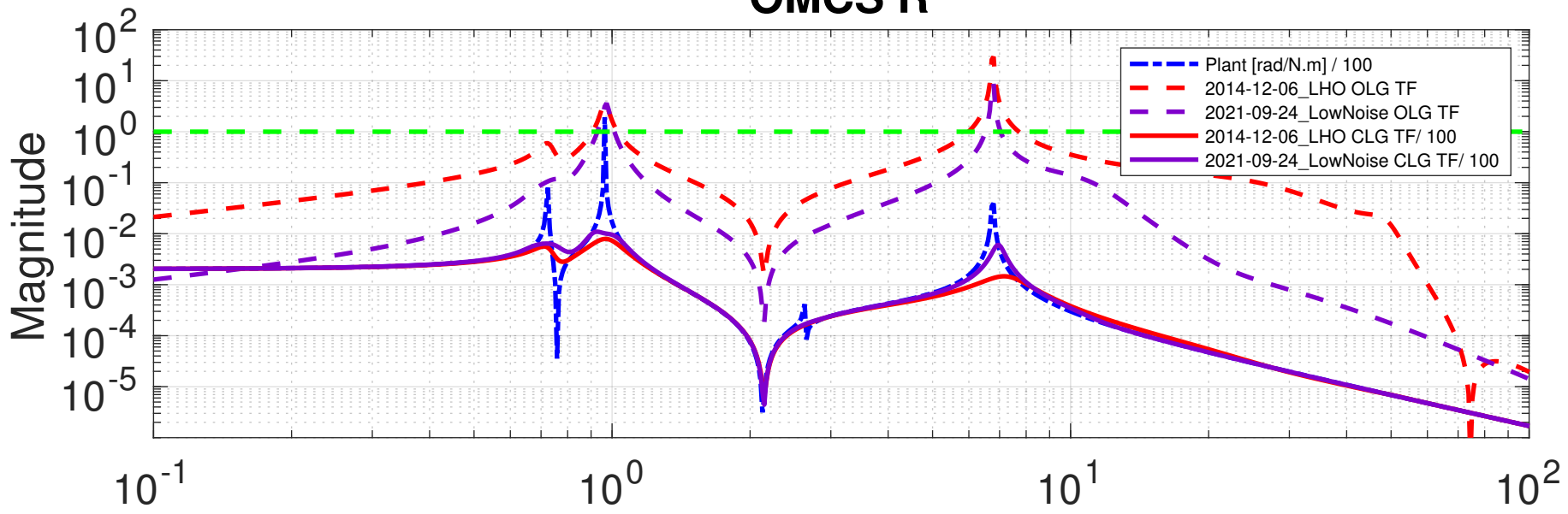

Damped Impulse Response, DOF: V
1/e Time Difference (model 2 - model 1)= 0.435 [s]
V (2014-12-06_LHO)
V (2021-09-24_LowNoise)
1/e Time = 1.7 [s]
1/e Time = 1.26 [s] (x1.3 better)
M1 Impulse
M2 Displacement [m]
0.03
0.02
0.01
0
-0.01
-0.02
-0.03
0
1
2
3
4
5
6
7
8
9
10
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

Damping Loop Performance Comparison
H1:SUS-OMC V Optic Displacement

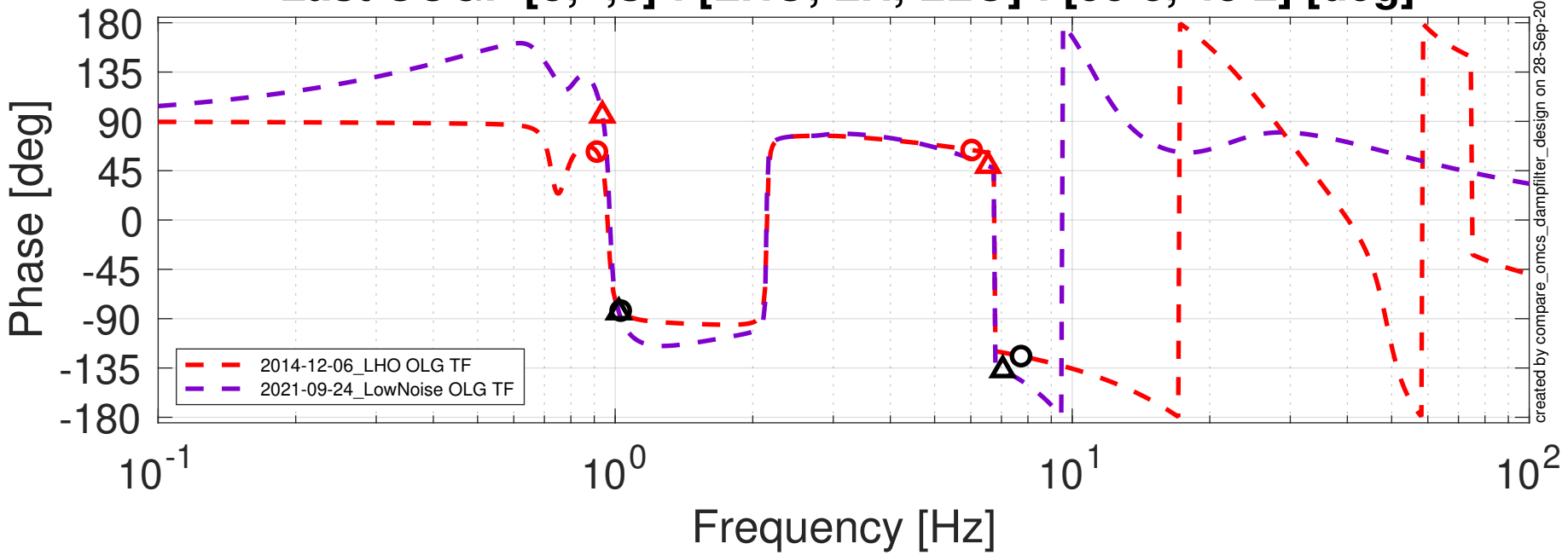


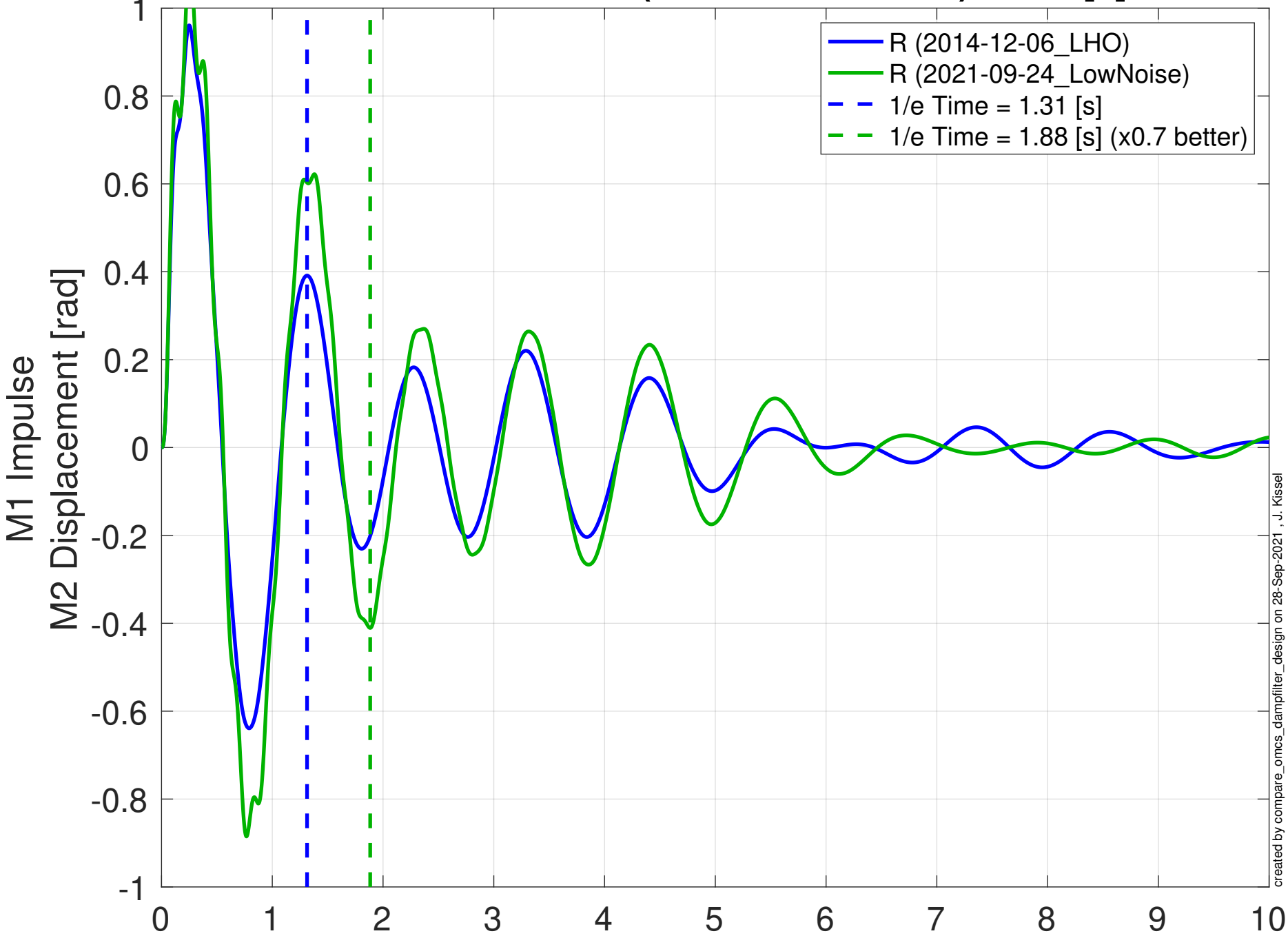

Calibrated Damping Filter Comparison
DOF: R
Magnitude [N.m/rad]
Frequency [Hz]
Phase [deg]
Frequency [Hz]
2014-12-06_LHO
2021-09-24_LowNoise
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

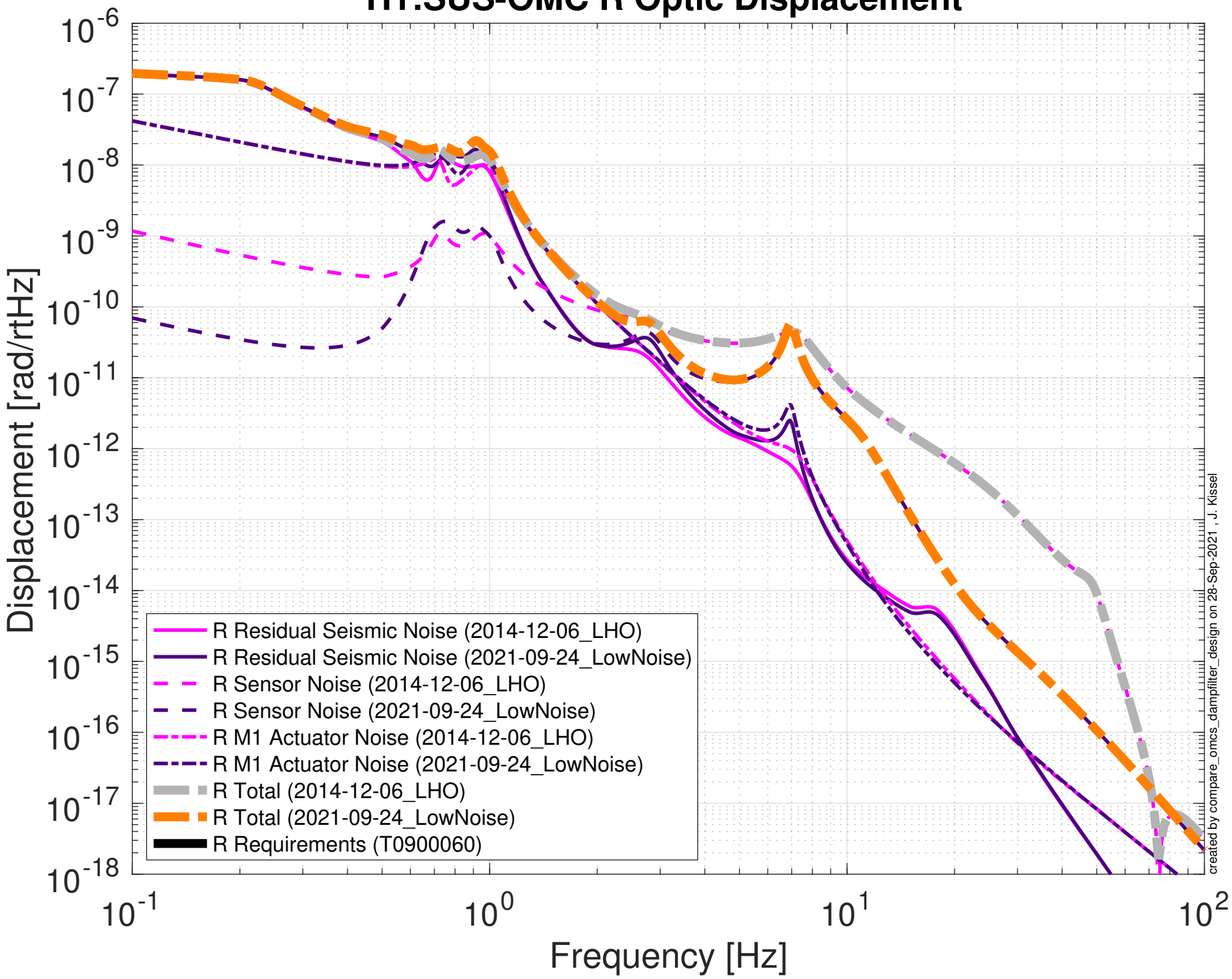
Damping Loop Design Comparison
OMCS R

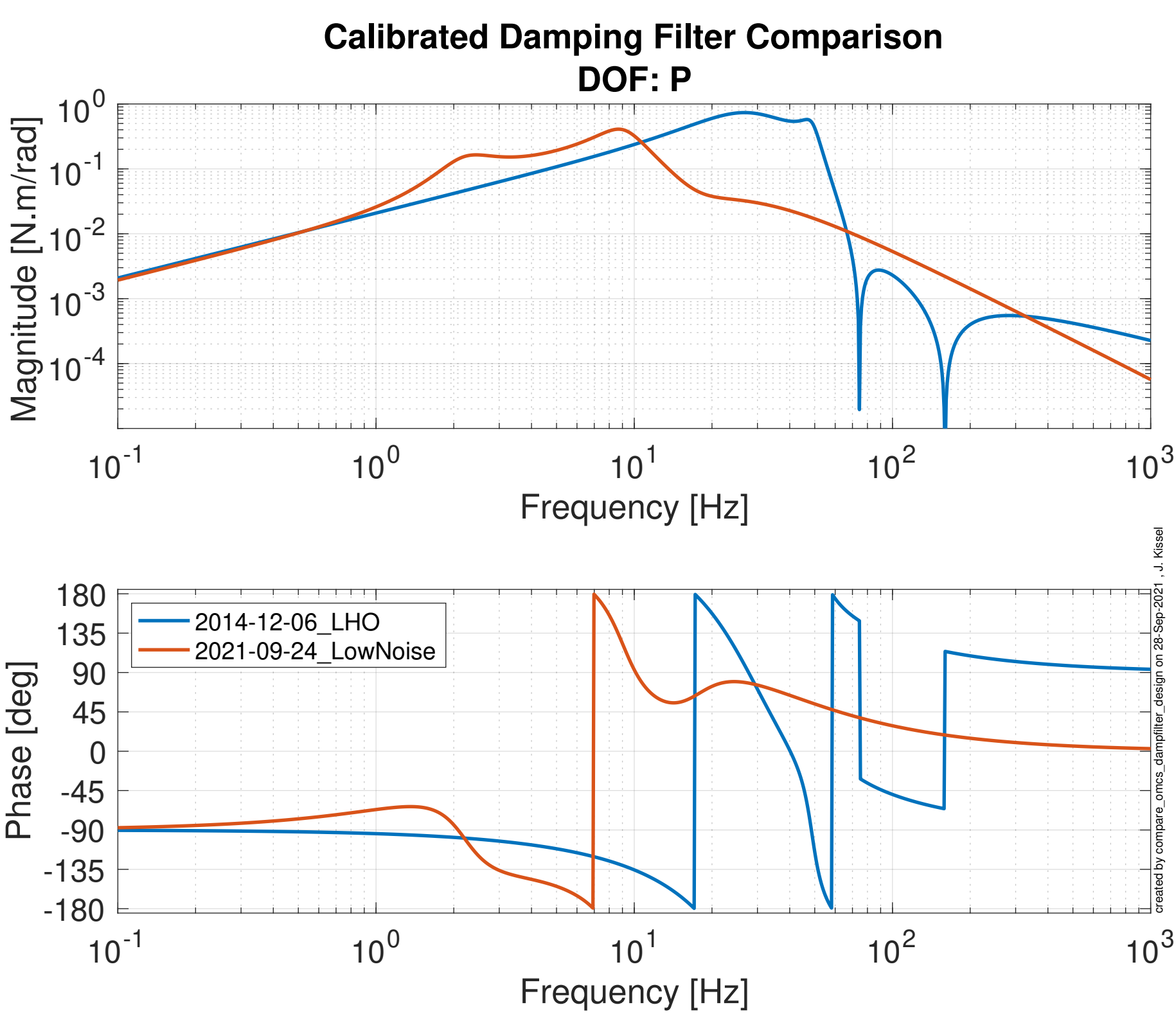


First LUGF [o,^,s] : [LHO, LN, LLO] : [118, 84.5] [deg]
Last UUGF [o,^,s] : [LHO, LN, LLO] : [55.8, 43.2] [deg]

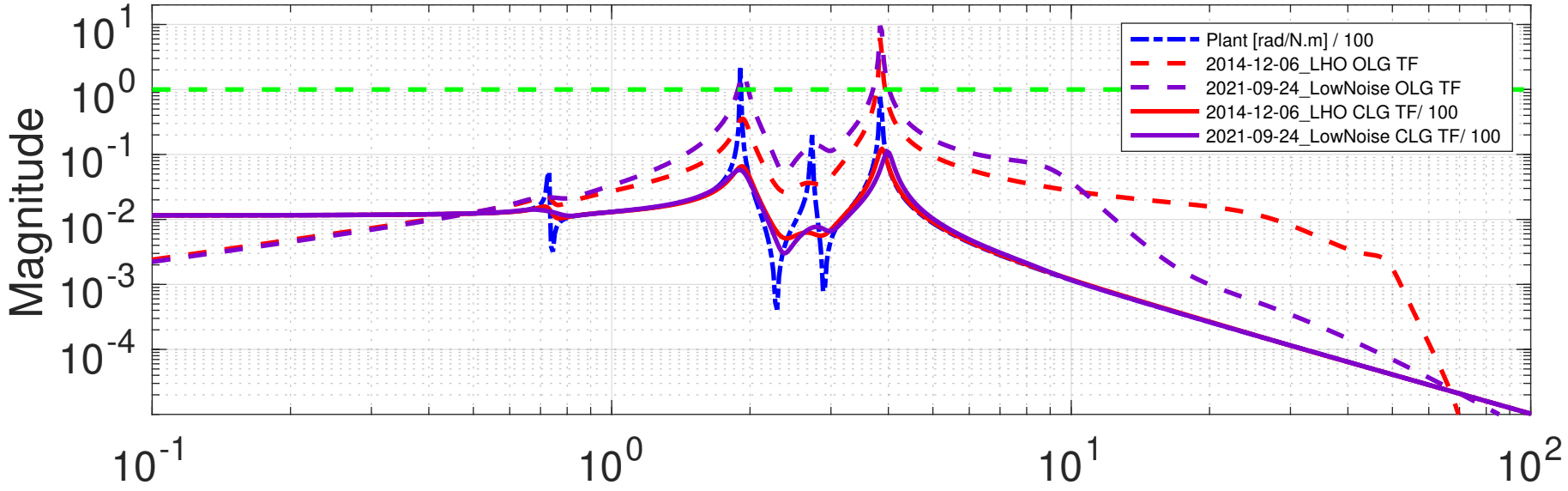



Damped Impulse Response, DOF: R
1/e Time Difference (model 2 - model 1)= 0.57 [s]
R (2014-12-06_LHO)
R (2021-09-24_LowNoise)
1/e Time = 1.31 [s]
1/e Time = 1.88 [s] (x0.7 better)
M1 Impulse
M2 Displacement [rad]
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
1
2
3
4
5
6
7
8
9
10
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

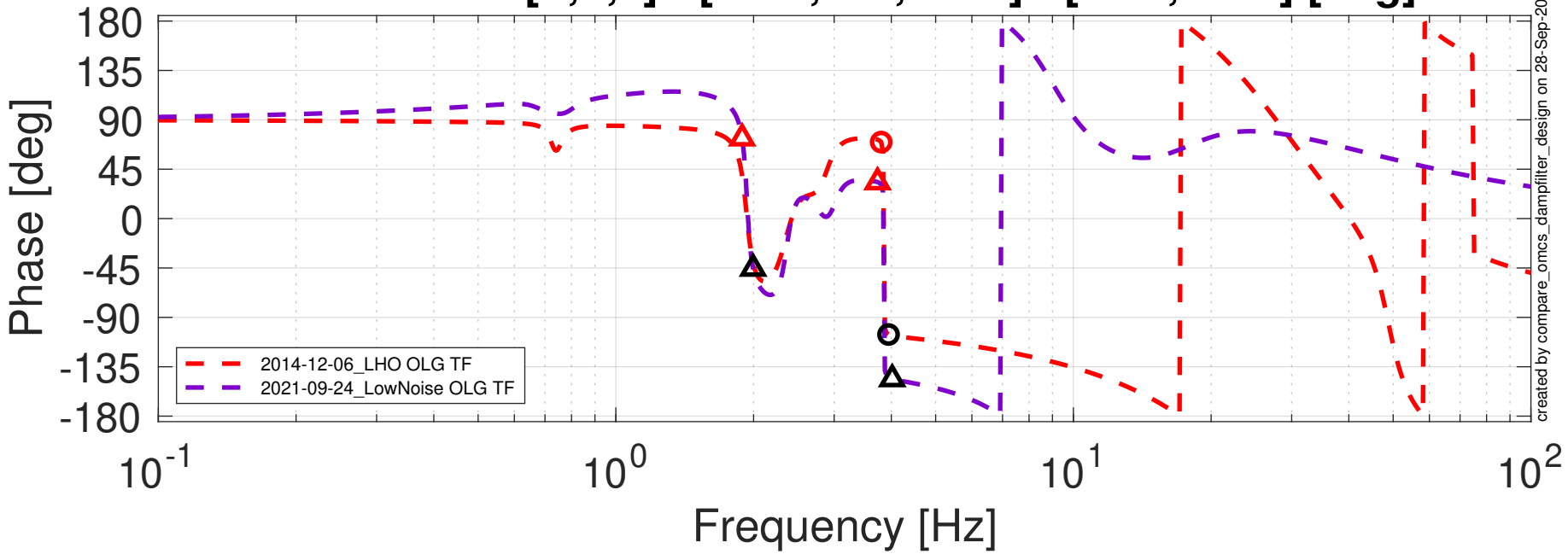

Damping Loop Performance Comparison
H1:SUS-OMC R Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
R Residual Seismic Noise (2014-12-06_LHO)
R Residual Seismic Noise (2021-09-24_LowNoise)
R Sensor Noise (2014-12-06_LHO)
R Sensor Noise (2021-09-24_LowNoise)
R M1 Actuator Noise (2014-12-06_LHO)
R M1 Actuator Noise (2021-09-24_LowNoise)
R Total (2014-12-06_LHO)
R Total (2021-09-24_LowNoise)
R Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

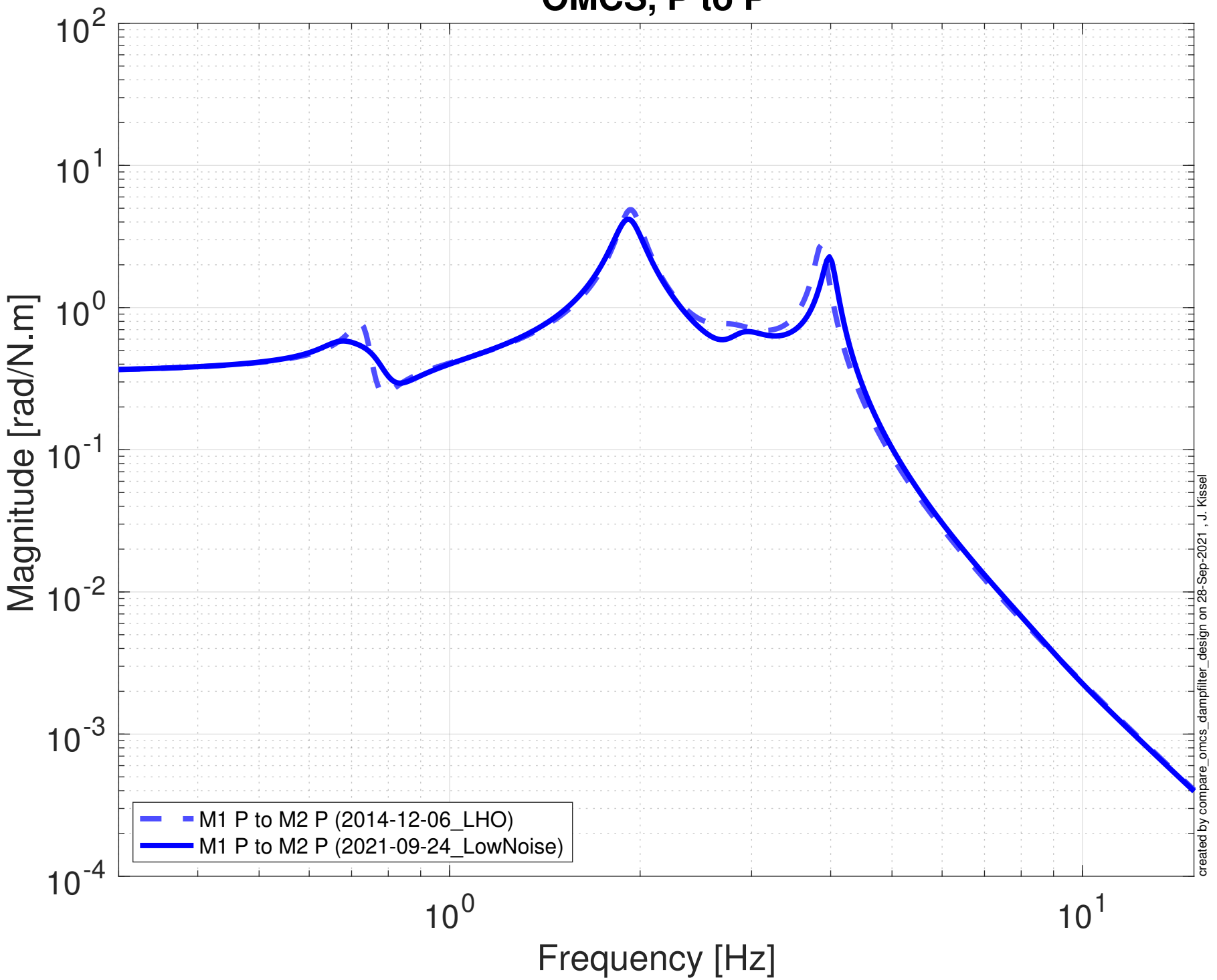

Calibrated Damping Filter Comparison
DOF: P
Magnitude [N.m/rad]
Frequency [Hz]
Phase [deg]
Frequency [Hz]
2014-12-06_LHO
2021-09-24_LowNoise
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

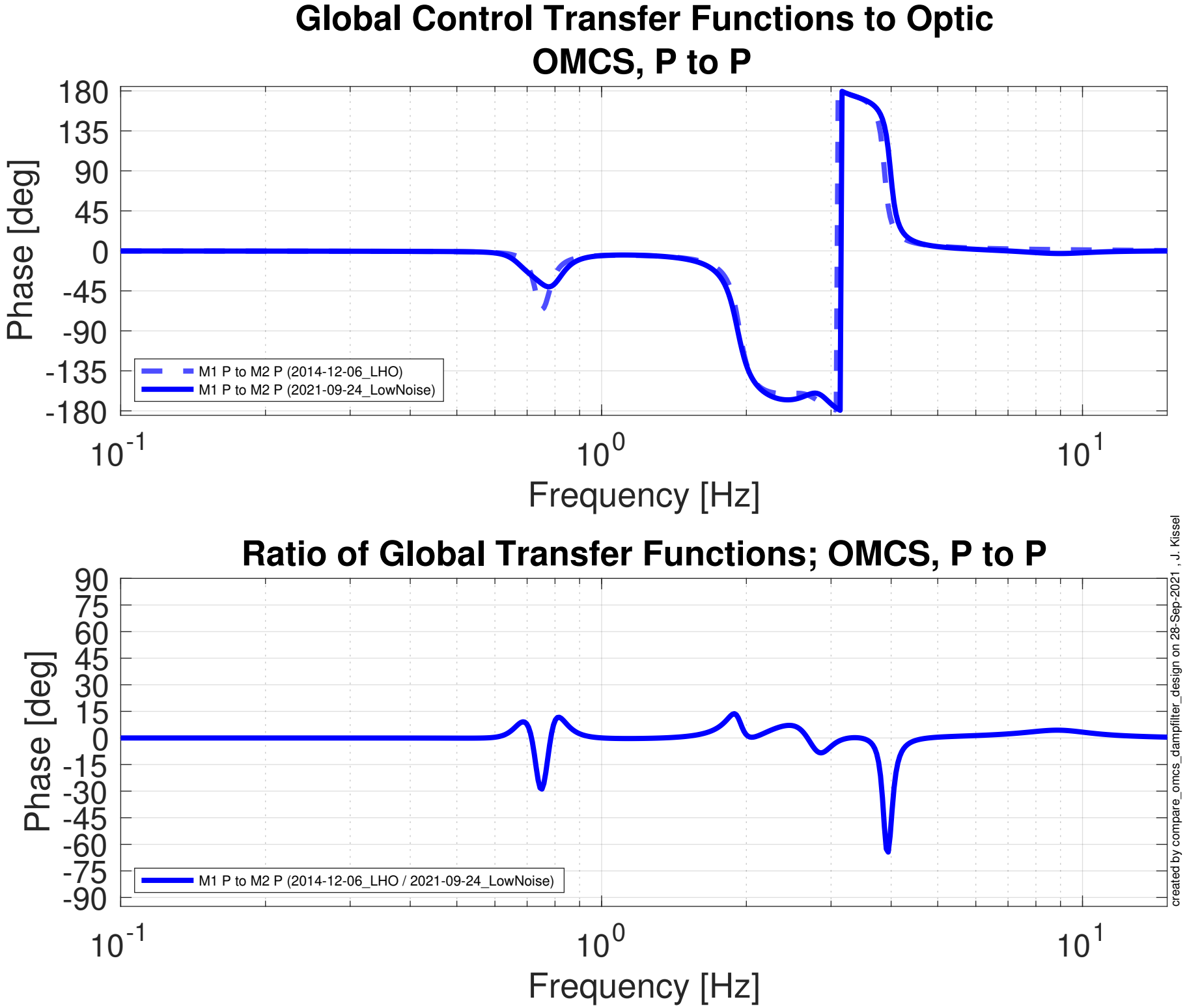
Damping Loop Design Comparison
OMCS P

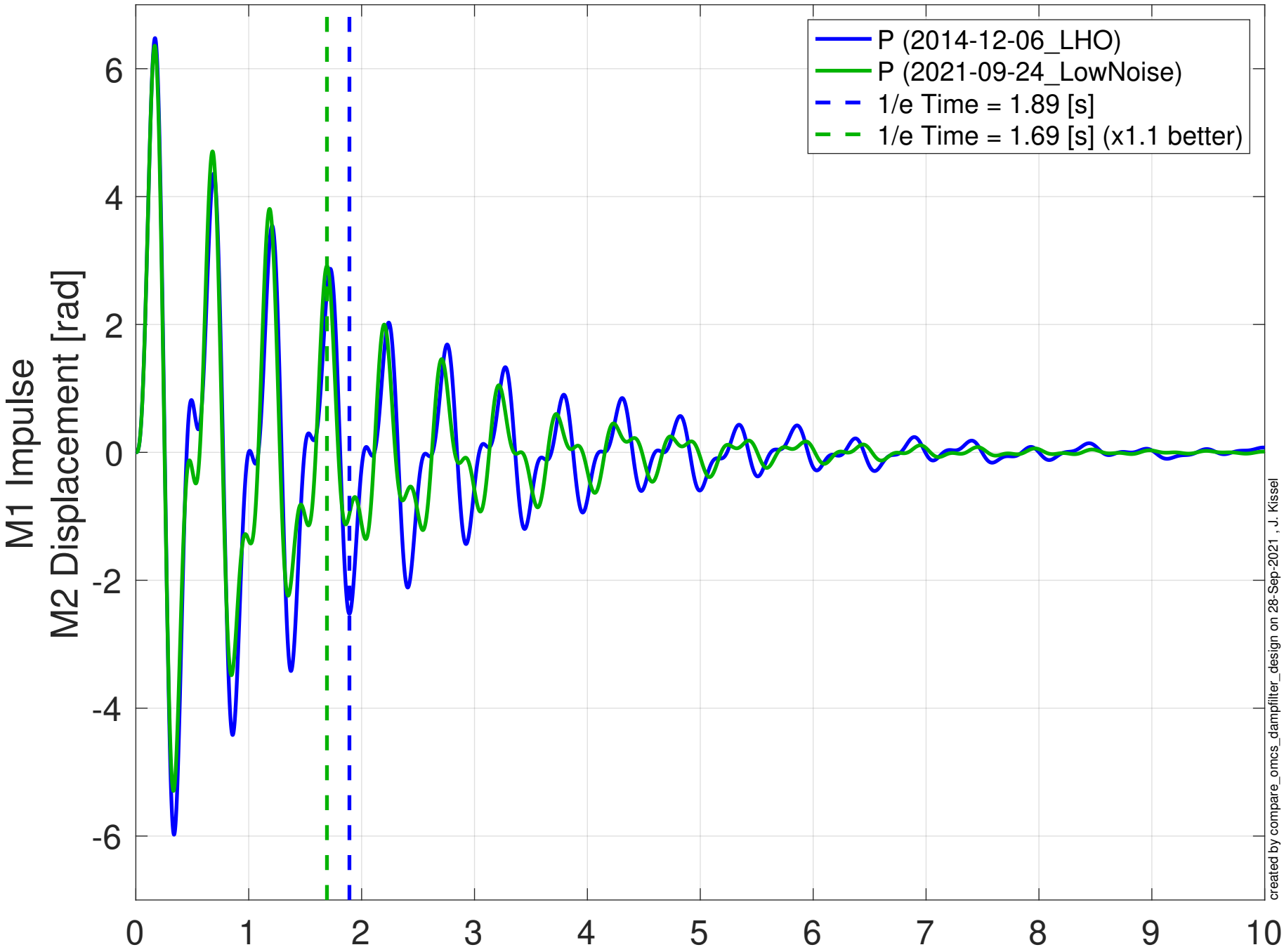


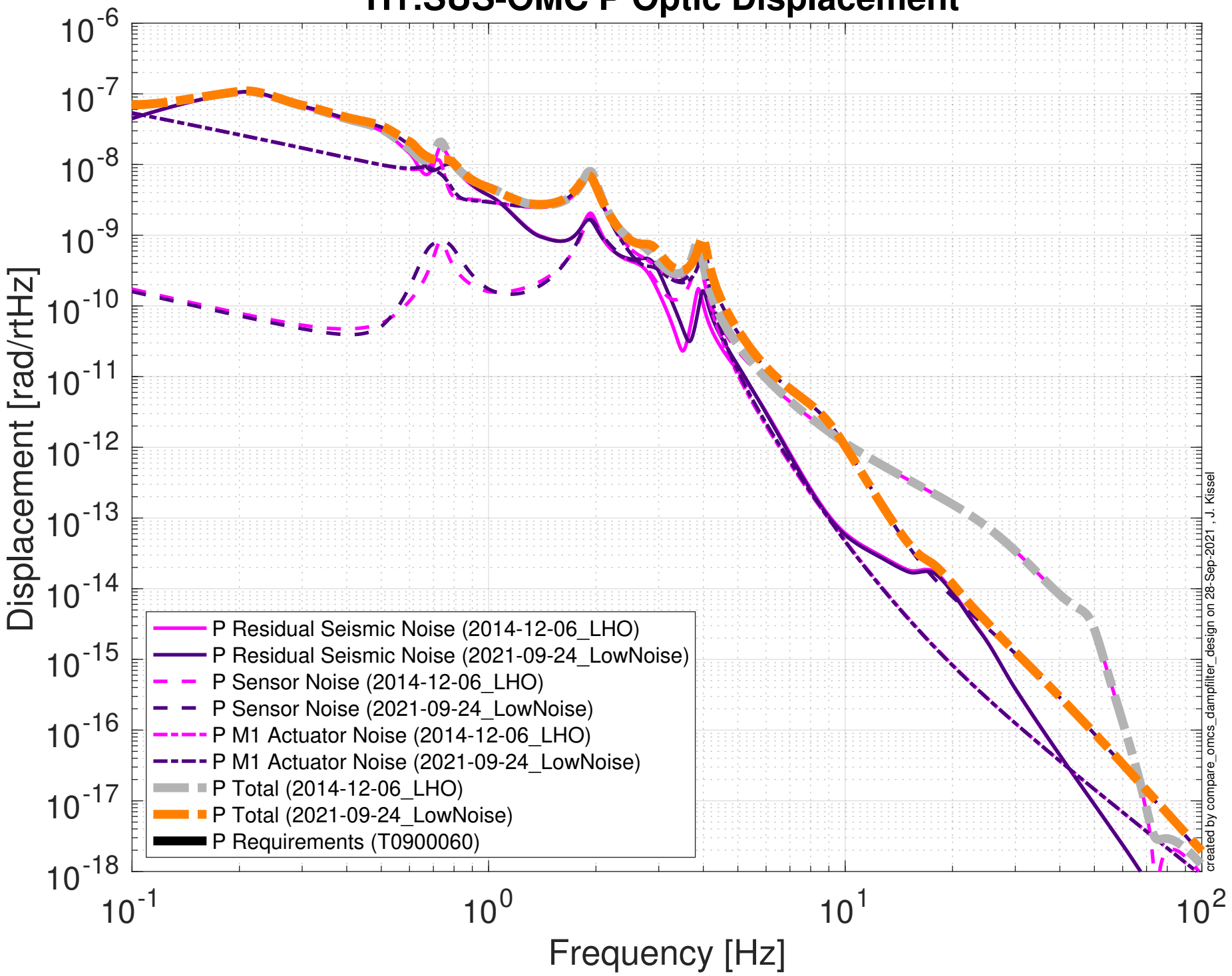
First LUGF [o,^,s] : [LHO, LN, LLO] : [110, 107] [deg]
Last UUGF [o,^,s] : [LHO, LN, LLO] : [74.4, 33.8] [deg]

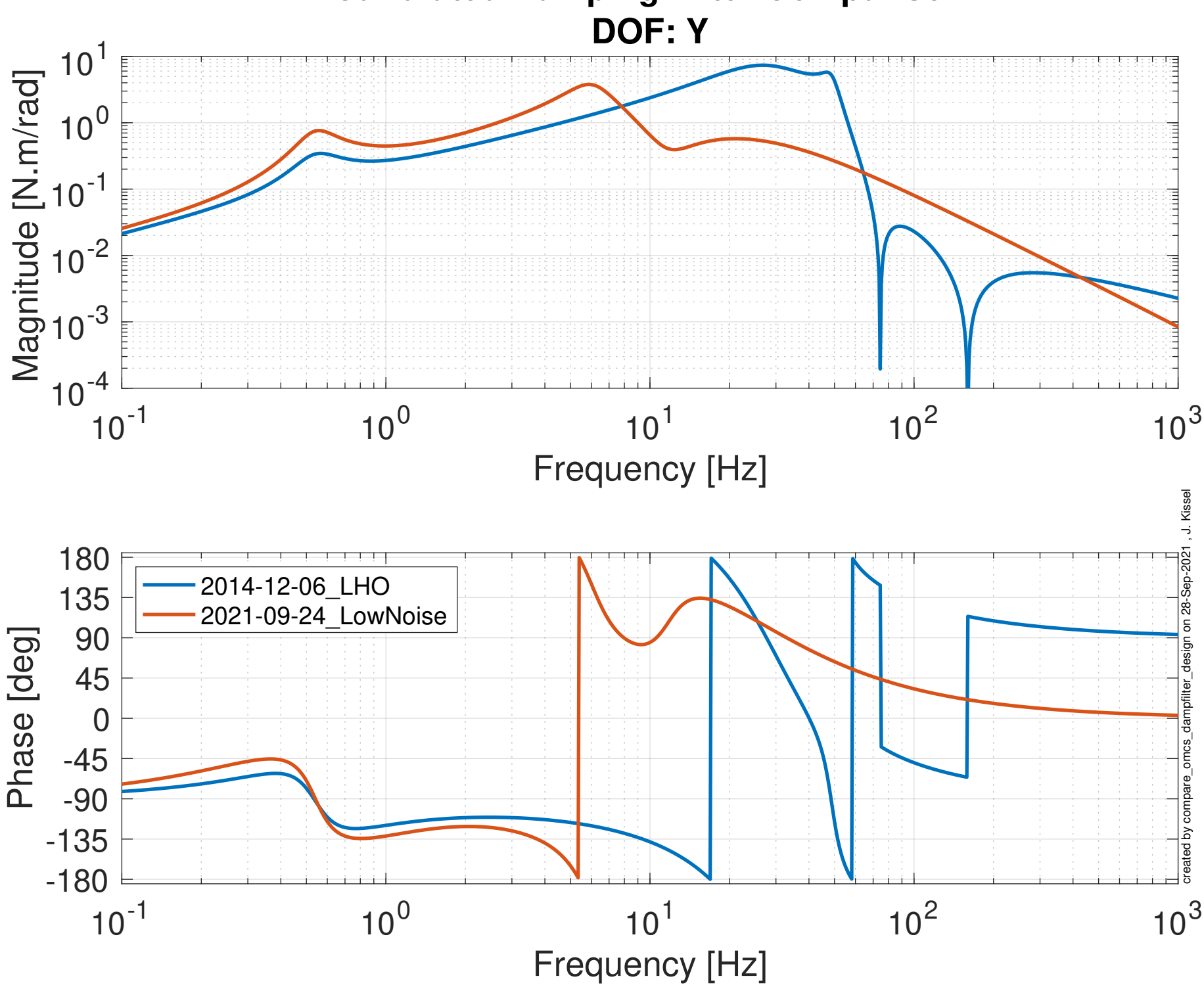



Global Control Transfer Functions to Optic
OMCS, P to P
Magnitude [rad/N.m]
Frequency [Hz]
M1 P to M2 P (2014-12-06_LHO)
M1 P to M2 P (2021-09-24_LowNoise)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

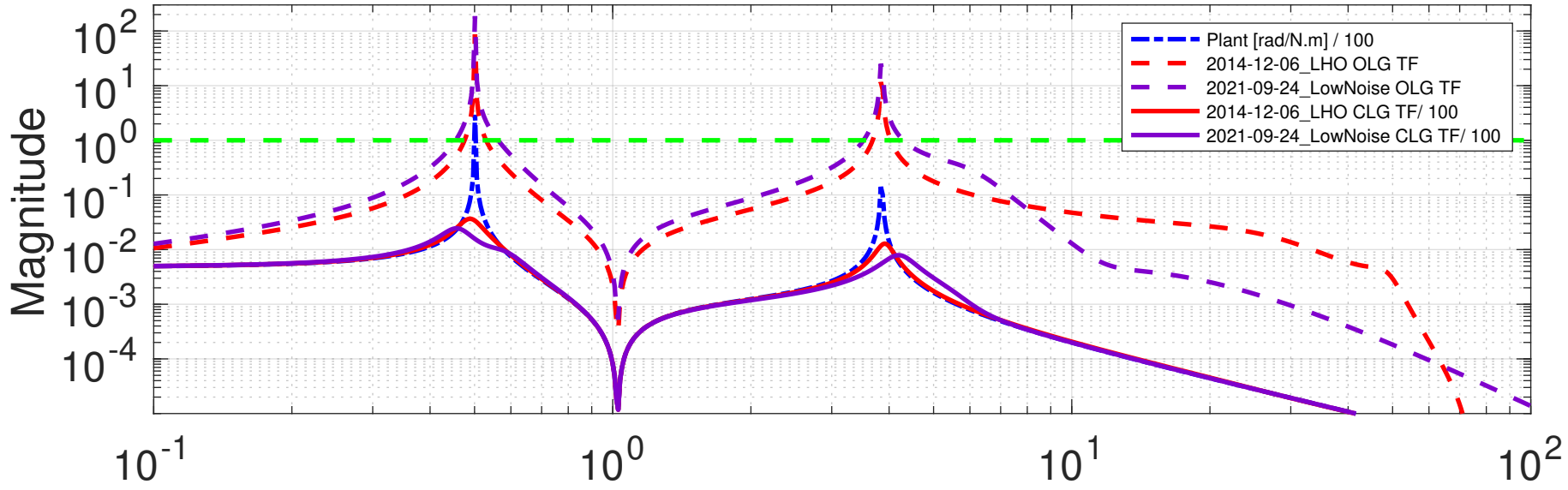

Global Control Transfer Functions to Optic
OMCS, P to P
Phase [deg]
180
135
90
45
0
-45
-90
-135
-180
M1 P to M2 P (2014-12-06_LHO)
M1 P to M2 P (2021-09-24_LowNoise)
10^-1
10^0
10^1
Frequency [Hz]
Ratio of Global Transfer Functions; OMCS, P to P
Phase [deg]
90
75
60
45
30
15
0
-15
-30
-45
-60
-75
-90
M1 P to M2 P (2014-12-06_LHO / 2021-09-24_LowNoise)
10^-1
10^0
10^1
Frequency [Hz]
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Damped Impulse Response, DOF: P
1/e Time Difference (model 2 - model 1)= 0.199 [s]
P (2014-12-06_LHO)
P (2021-09-24_LowNoise)
1/e Time = 1.89 [s]
1/e Time = 1.69 [s] (x1.1 better)
M1 Impulse
M2 Displacement [rad]
6
4
2
0
-2
-4
-6
0
1
2
3
4
5
6
7
8
9
10
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

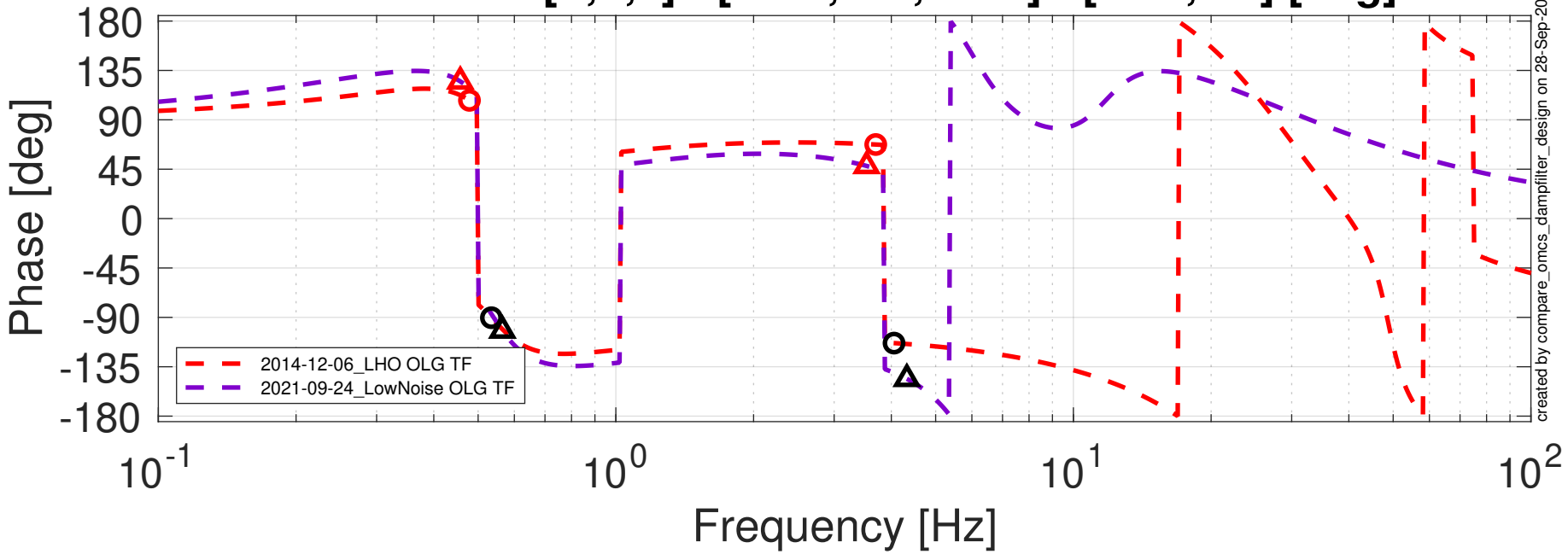

Damping Loop Performance Comparison
H1:SUS-OMC P Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
P Residual Seismic Noise (2014-12-06_LHO)
P Residual Seismic Noise (2021-09-24_LowNoise)
P Sensor Noise (2014-12-06_LHO)
P Sensor Noise (2021-09-24_LowNoise)
P M1 Actuator Noise (2014-12-06_LHO)
P M1 Actuator Noise (2021-09-24_LowNoise)
P Total (2014-12-06_LHO)
P Total (2021-09-24_LowNoise)
P Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

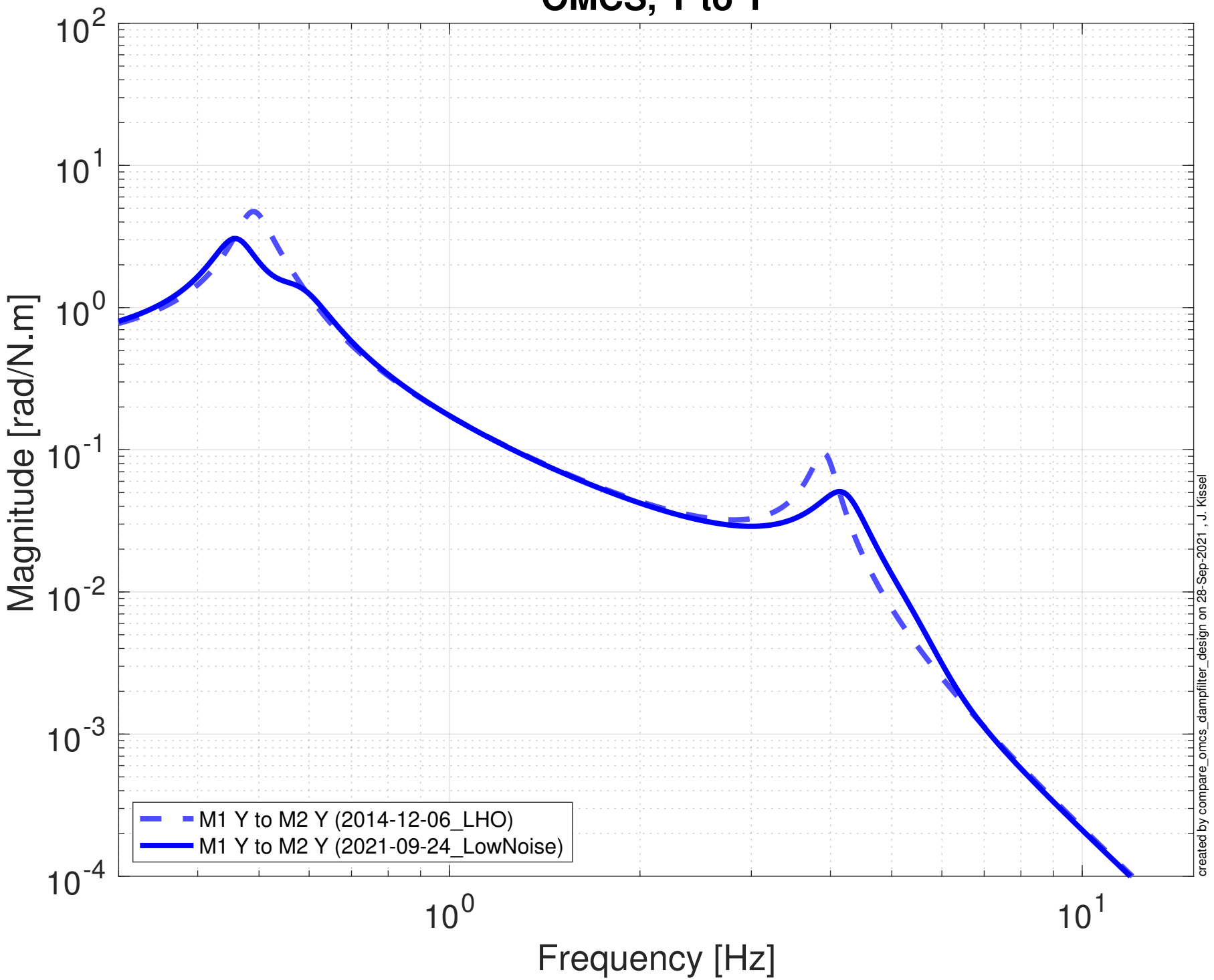

Calibrated Damping Filter Comparison
DOF: Y
Magnitude [N.m/rad]
Frequency [Hz]
Phase [deg]
Frequency [Hz]
2014-12-06_LHO
2021-09-24_LowNoise
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

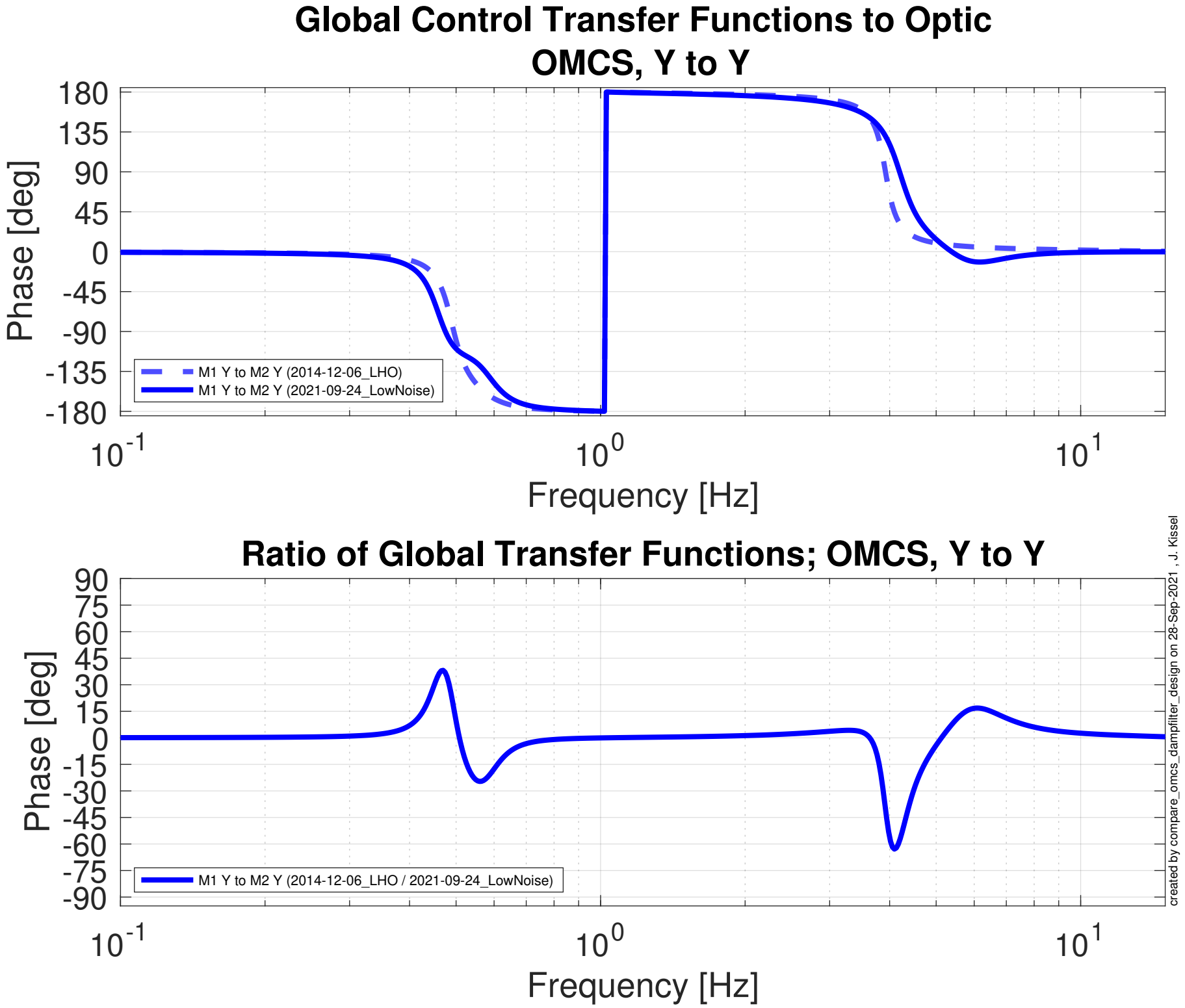
Damping Loop Design Comparison
OMCS Y

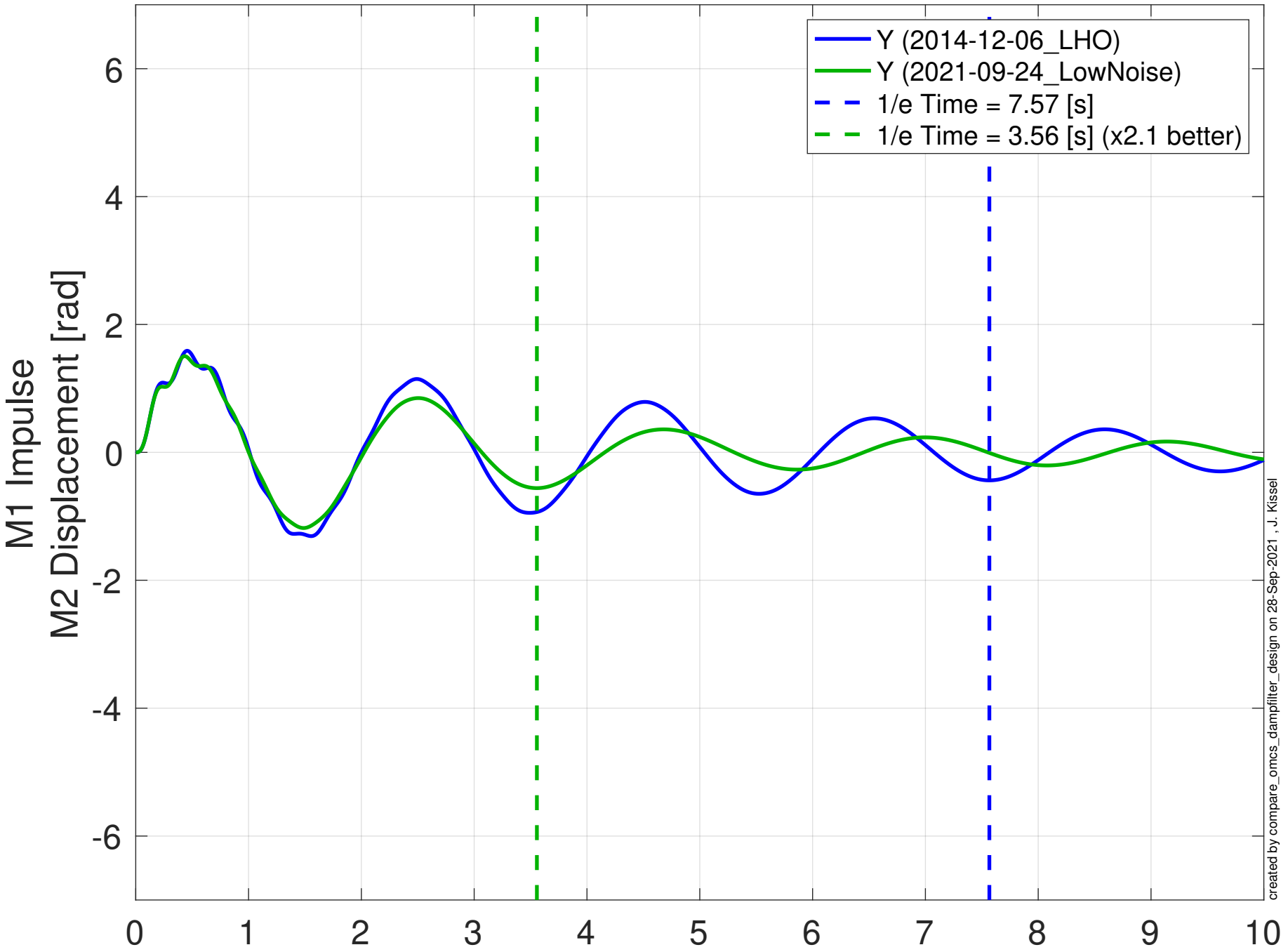


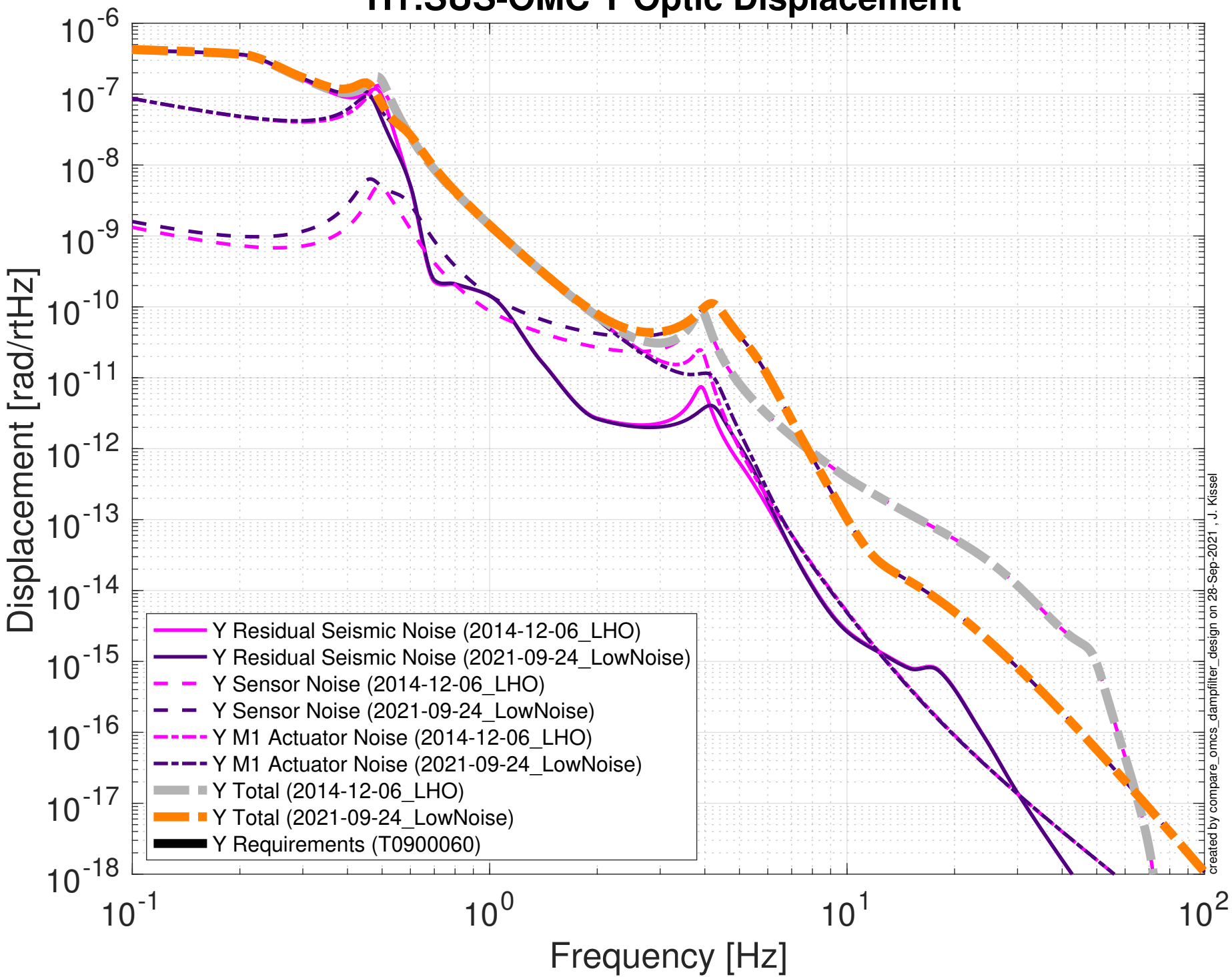
First LUGF [o,^,s] : [LHO, LN, LLO] : [72.2, 55] [deg]
Last UUGF [o,^,s] : [LHO, LN, LLO] : [66.5, 34] [deg]

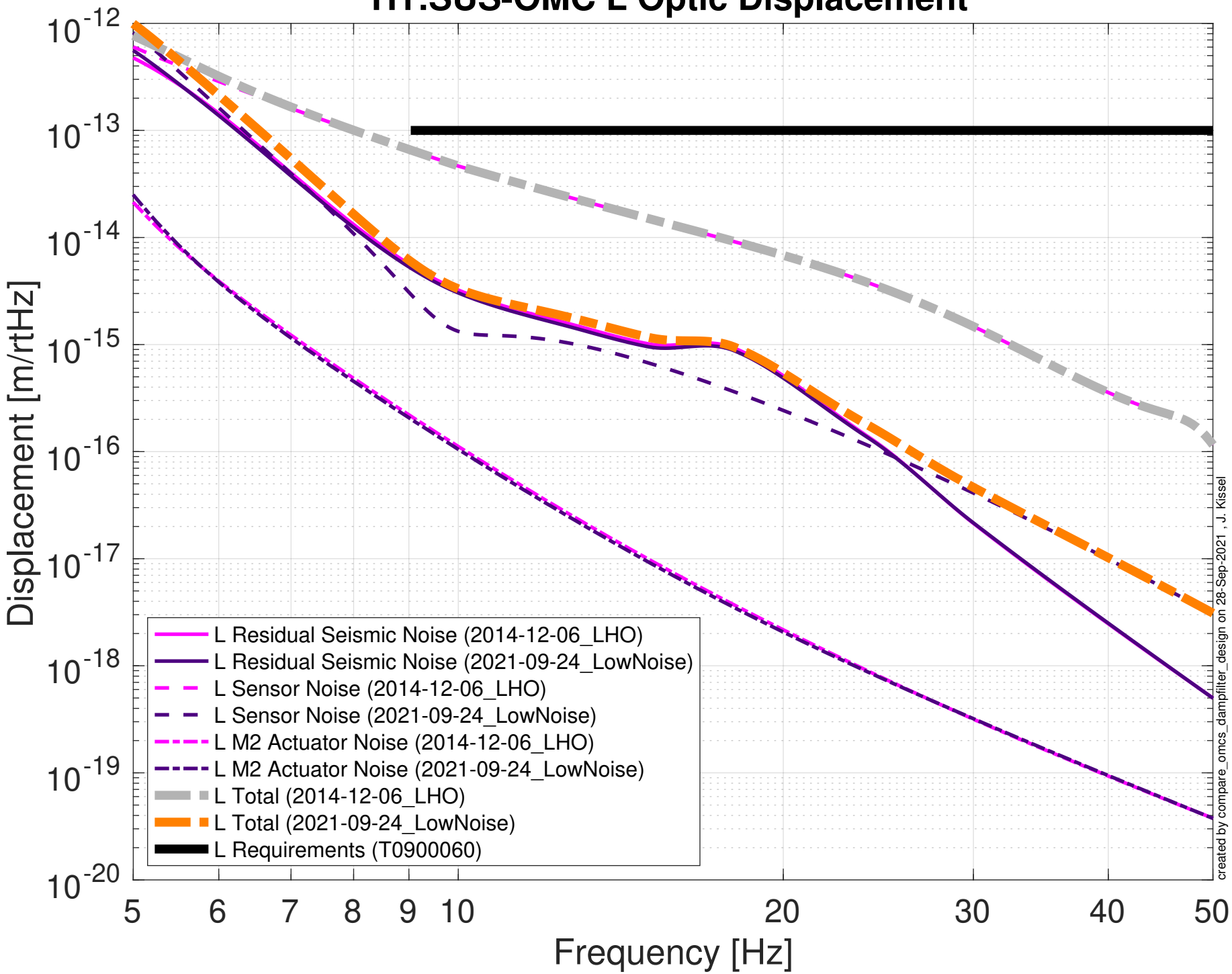


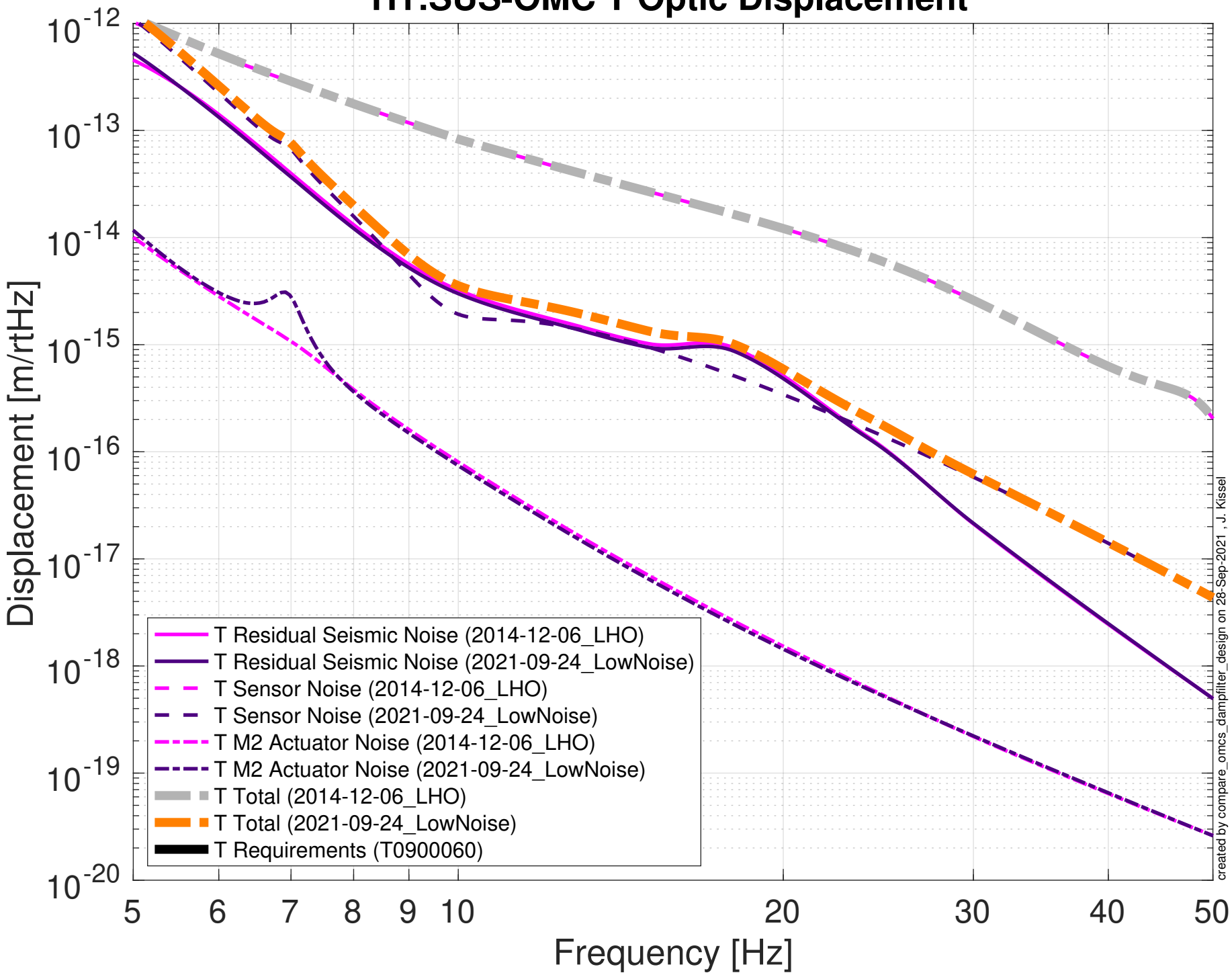

Global Control Transfer Functions to Optic
OMCS, Y to Y
Magnitude [rad/N.m]
Frequency [Hz]
M1 Y to M2 Y (2014-12-06_LHO)
M1 Y to M2 Y (2021-09-24_LowNoise)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

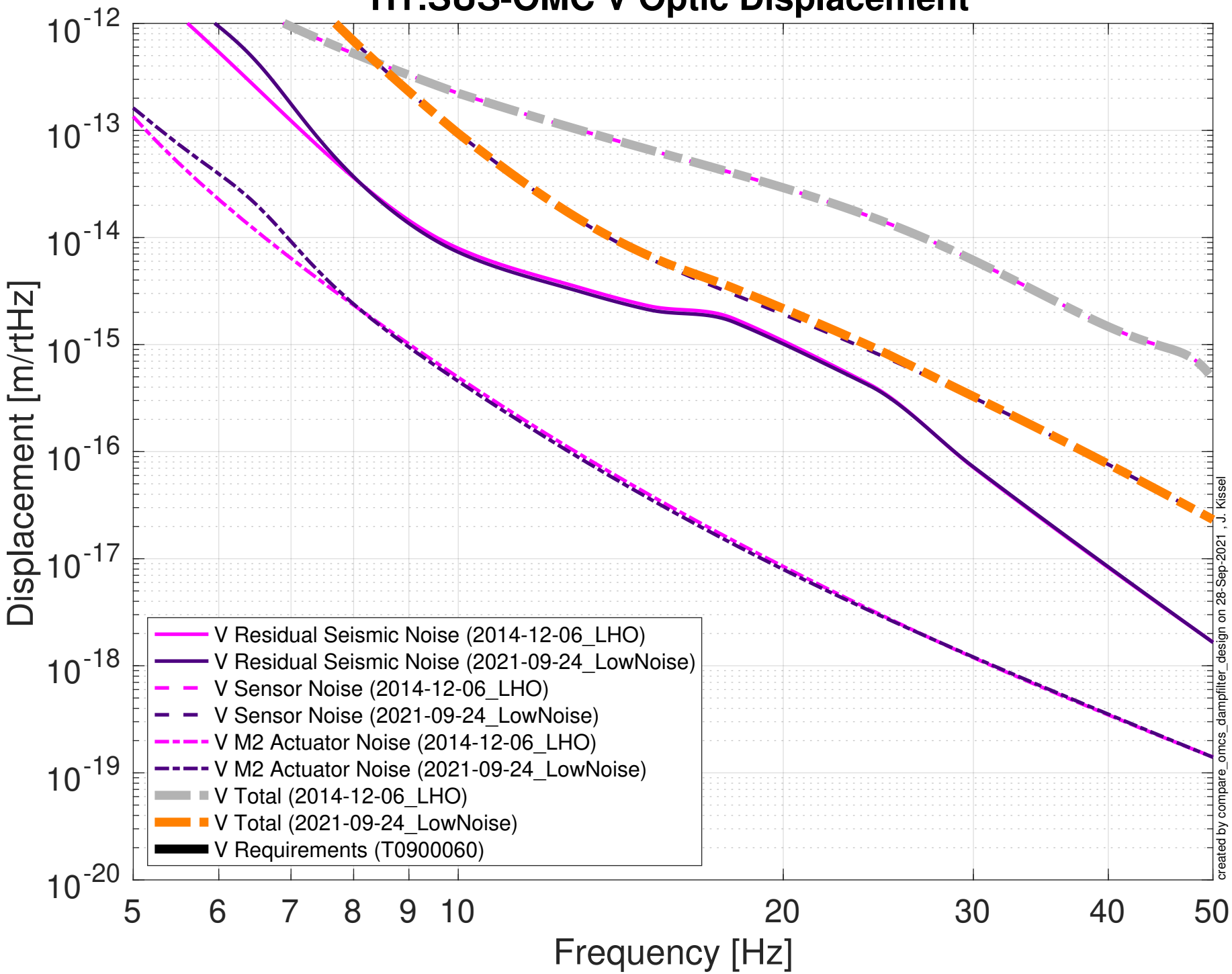

Global Control Transfer Functions to Optic
OMCS, Y to Y
Phase [deg]
180
135
90
45
0
-45
-90
-135
-180
M1 Y to M2 Y (2014-12-06_LHO)
M1 Y to M2 Y (2021-09-24_LowNoise)
10^-1
10^0
10^1
Frequency [Hz]
Ratio of Global Transfer Functions; OMCS, Y to Y
Phase [deg]
90
75
60
45
30
15
0
-15
-30
-45
-60
-75
-90
M1 Y to M2 Y (2014-12-06_LHO / 2021-09-24_LowNoise)
10^-1
10^0
10^1
Frequency [Hz]
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

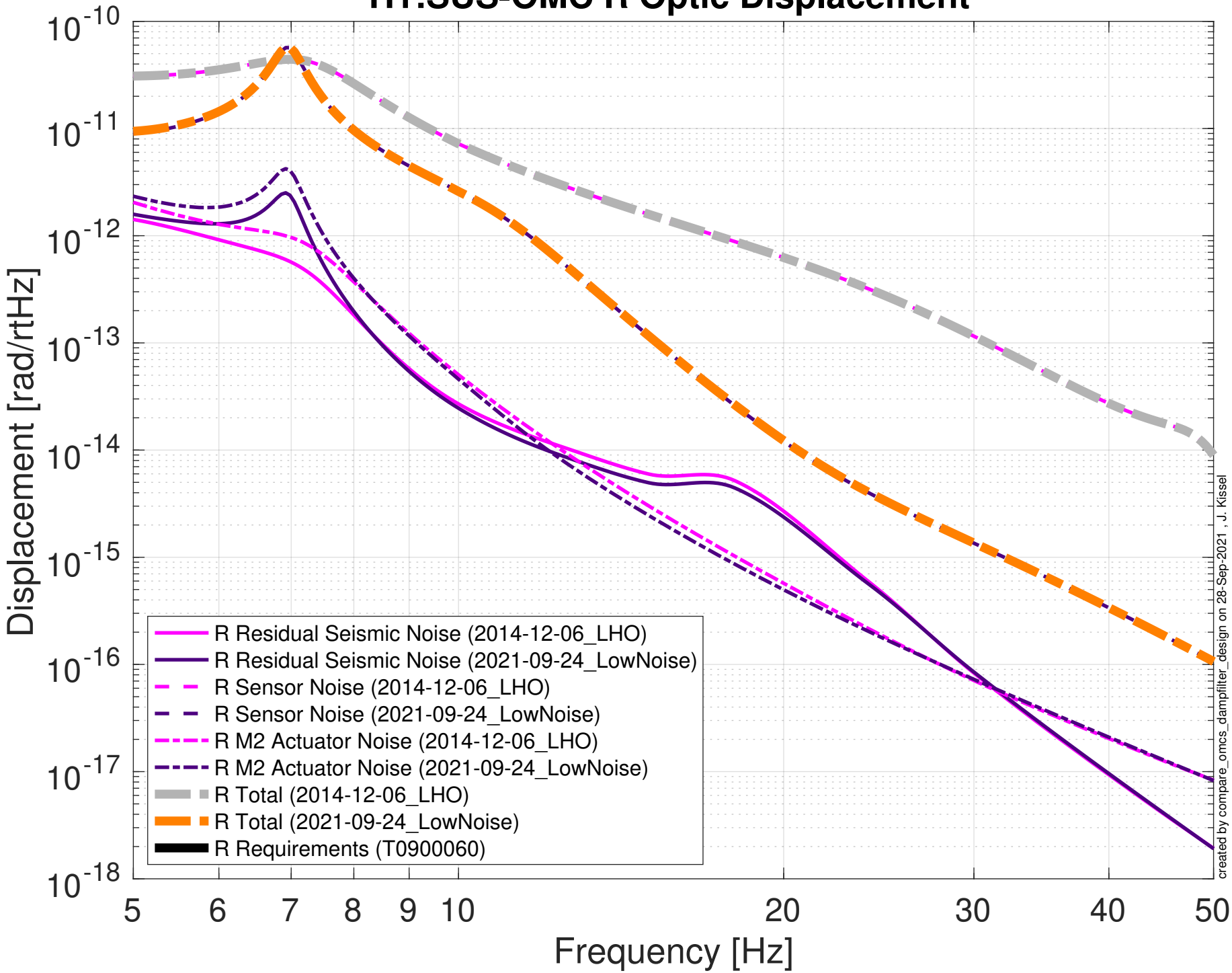

Damped Impulse Response, DOF: Y
1/e Time Difference (model 2 - model 1)= 4.01 [s]
Y (2014-12-06_LHO)
Y (2021-09-24_LowNoise)
1/e Time = 7.57 [s]
1/e Time = 3.56 [s] (x2.1 better)
M1 Impulse
M2 Displacement [rad]
6
4
2
0
-2
-4
-6
0
1
2
3
4
5
6
7
8
9
10
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

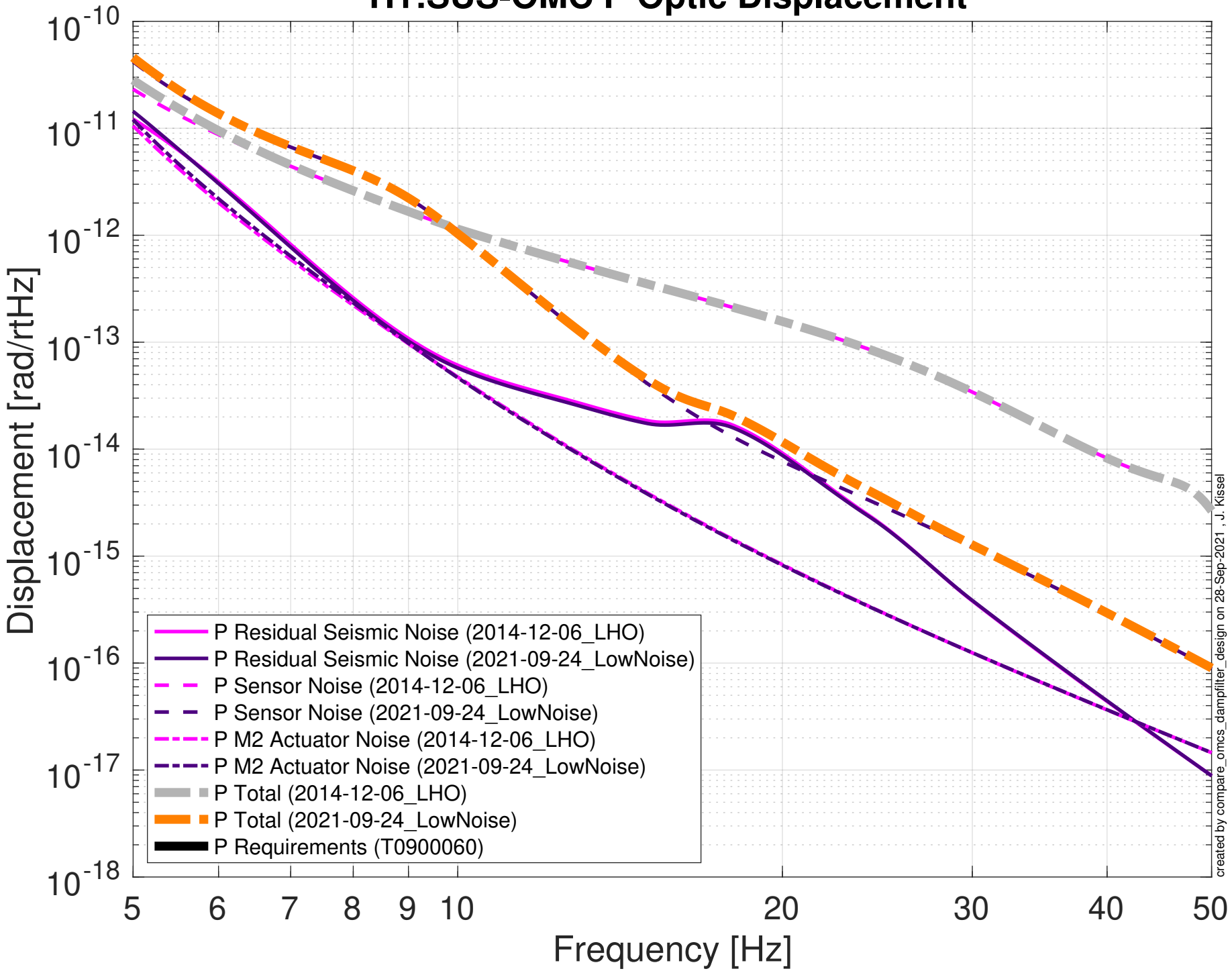

Damping Loop Performance Comparison
H1:SUS-OMC Y Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
Y Residual Seismic Noise (2014-12-06_LHO)
Y Residual Seismic Noise (2021-09-24_LowNoise)
Y Sensor Noise (2014-12-06_LHO)
Y Sensor Noise (2021-09-24_LowNoise)
Y M1 Actuator Noise (2014-12-06_LHO)
Y M1 Actuator Noise (2021-09-24_LowNoise)
Y Total (2014-12-06_LHO)
Y Total (2021-09-24_LowNoise)
Y Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel

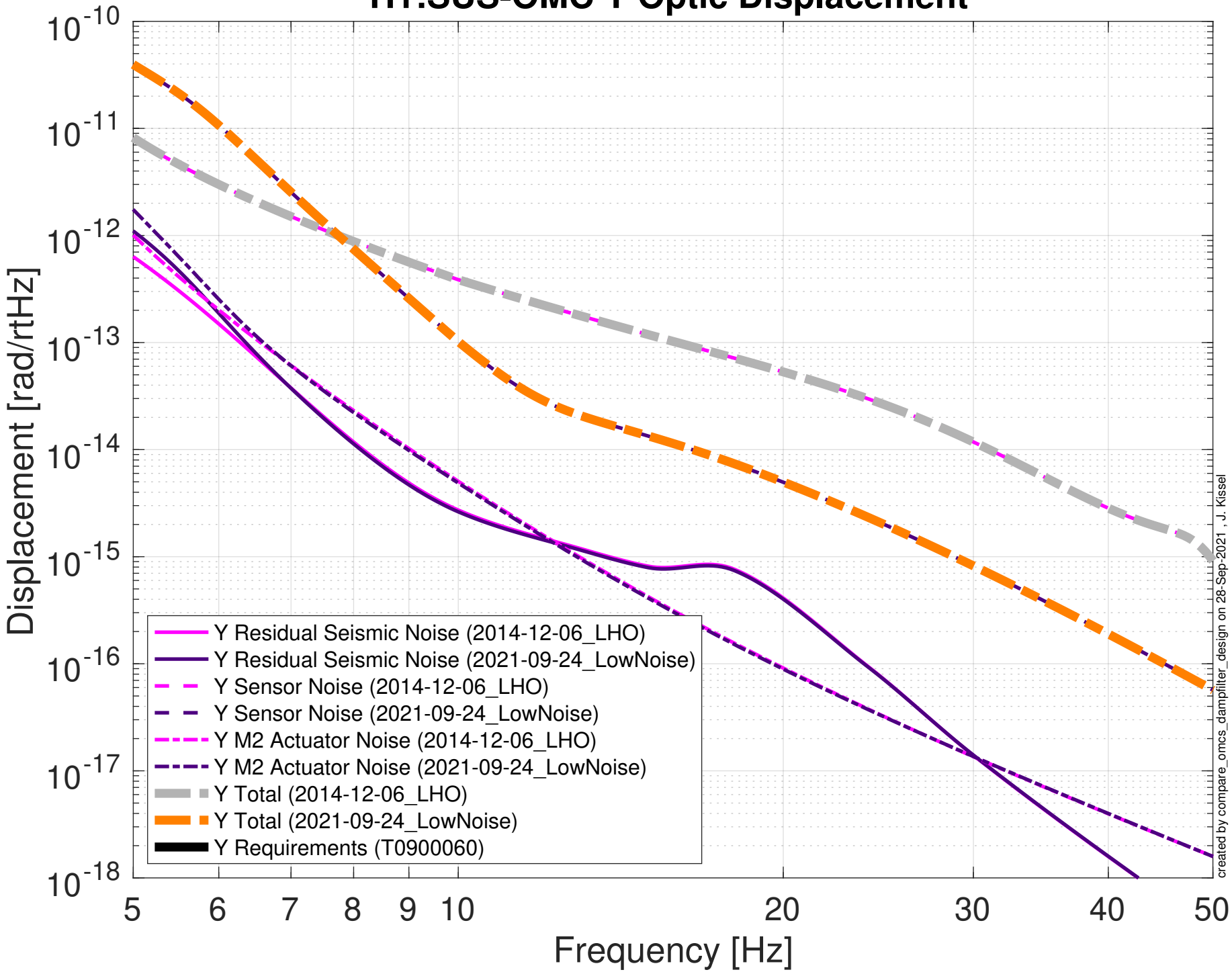

Damping Loop Performance Comparison
H1:SUS-OMC L Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
L Residual Seismic Noise (2014-12-06_LHO)
L Residual Seismic Noise (2021-09-24_LowNoise)
L Sensor Noise (2014-12-06_LHO)
L Sensor Noise (2021-09-24_LowNoise)
L M2 Actuator Noise (2014-12-06_LHO)
L M2 Actuator Noise (2021-09-24_LowNoise)
L Total (2014-12-06_LHO)
L Total (2021-09-24_LowNoise)
L Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Damping Loop Performance Comparison
H1:SUS-OMC T Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
T Residual Seismic Noise (2014-12-06_LHO)
T Residual Seismic Noise (2021-09-24_LowNoise)
T Sensor Noise (2014-12-06_LHO)
T Sensor Noise (2021-09-24_LowNoise)
T M2 Actuator Noise (2014-12-06_LHO)
T M2 Actuator Noise (2021-09-24_LowNoise)
T Total (2014-12-06_LHO)
T Total (2021-09-24_LowNoise)
T Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Damping Loop Performance Comparison
H1:SUS-OMC V Optic Displacement
Displacement [m/rtHz]
Frequency [Hz]
10^-12
10^-13
10^-14
10^-15
10^-16
10^-17
10^-18
10^-19
10^-20
5
6
7
8
9
10
20
30
40
50
V Residual Seismic Noise (2014-12-06_LHO)
V Residual Seismic Noise (2021-09-24_LowNoise)
V Sensor Noise (2014-12-06_LHO)
V Sensor Noise (2021-09-24_LowNoise)
V M2 Actuator Noise (2014-12-06_LHO)
V M2 Actuator Noise (2021-09-24_LowNoise)
V Total (2014-12-06_LHO)
V Total (2021-09-24_LowNoise)
V Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Damping Loop Performance Comparison
H1:SUS-OMC R Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
R Residual Seismic Noise (2014-12-06_LHO)
R Residual Seismic Noise (2021-09-24_LowNoise)
R Sensor Noise (2014-12-06_LHO)
R Sensor Noise (2021-09-24_LowNoise)
R M2 Actuator Noise (2014-12-06_LHO)
R M2 Actuator Noise (2021-09-24_LowNoise)
R Total (2014-12-06_LHO)
R Total (2021-09-24_LowNoise)
R Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Damping Loop Performance Comparison
H1:SUS-OMC P Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
P Residual Seismic Noise (2014-12-06_LHO)
P Residual Seismic Noise (2021-09-24_LowNoise)
P Sensor Noise (2014-12-06_LHO)
P Sensor Noise (2021-09-24_LowNoise)
P M2 Actuator Noise (2014-12-06_LHO)
P M2 Actuator Noise (2021-09-24_LowNoise)
P Total (2014-12-06_LHO)
P Total (2021-09-24_LowNoise)
P Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel


Damping Loop Performance Comparison
H1:SUS-OMC Y Optic Displacement
Displacement [rad/rtHz]
Frequency [Hz]
Y Residual Seismic Noise (2014-12-06_LHO)
Y Residual Seismic Noise (2021-09-24_LowNoise)
Y Sensor Noise (2014-12-06_LHO)
Y Sensor Noise (2021-09-24_LowNoise)
Y M2 Actuator Noise (2014-12-06_LHO)
Y M2 Actuator Noise (2021-09-24_LowNoise)
Y Total (2014-12-06_LHO)
Y Total (2021-09-24_LowNoise)
Y Requirements (T0900060)
created by compare_omcs_dampfilter_design on 28-Sep-2021 , J. Kissel