

Force Coefficient Trends

| GENERATED FOR LHO_EndX

Report Generated on September 27, 2022

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1 About

The force coefficients are calculated according to

Force Coefficient = $[1/(GS*WSGS*TX(RX)WS)]*[2*\cos(\text{theta})/c]$

Angle of Incidence (theta) = 8.75 deg

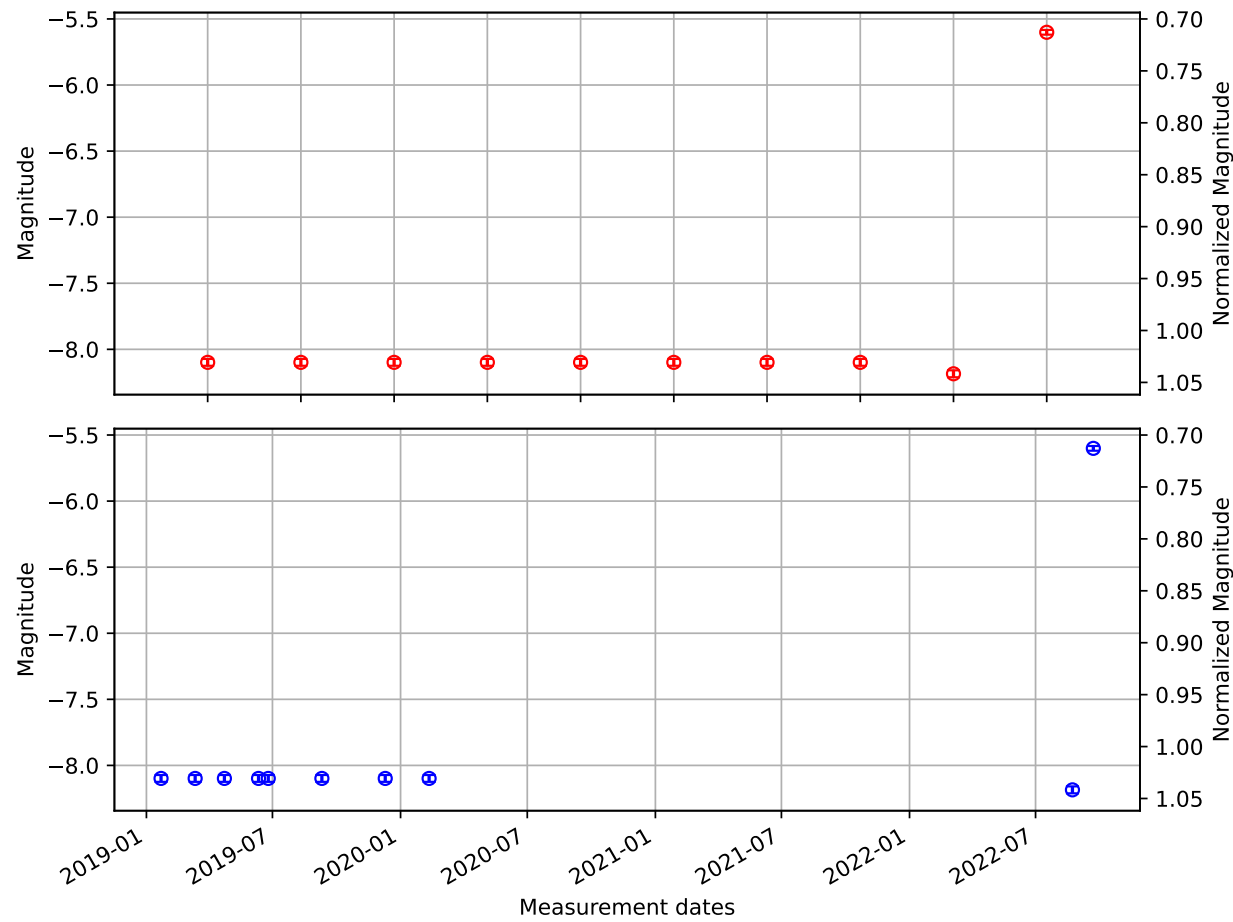
Speed of light (c) = 299792458 m/s

2 Gold Standard (ρ_{GS})

List of Measurements

Date	GS $\pm$ SE_GS	Normalized
D20190122	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20190312	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20190423	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20190611	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20190625	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20190910	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20191210	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20200211	-8.098500 $\pm$ -0.025915	(1 $\pm$ 0.003200)
D20220823	-8.185000 $\pm$ -0.026192	(1 $\pm$ 0.003200)
D20220922	-5.601000 $\pm$ -0.017923	(1 $\pm$ 0.003200)

Gold Standard



Summary of Gold Standard

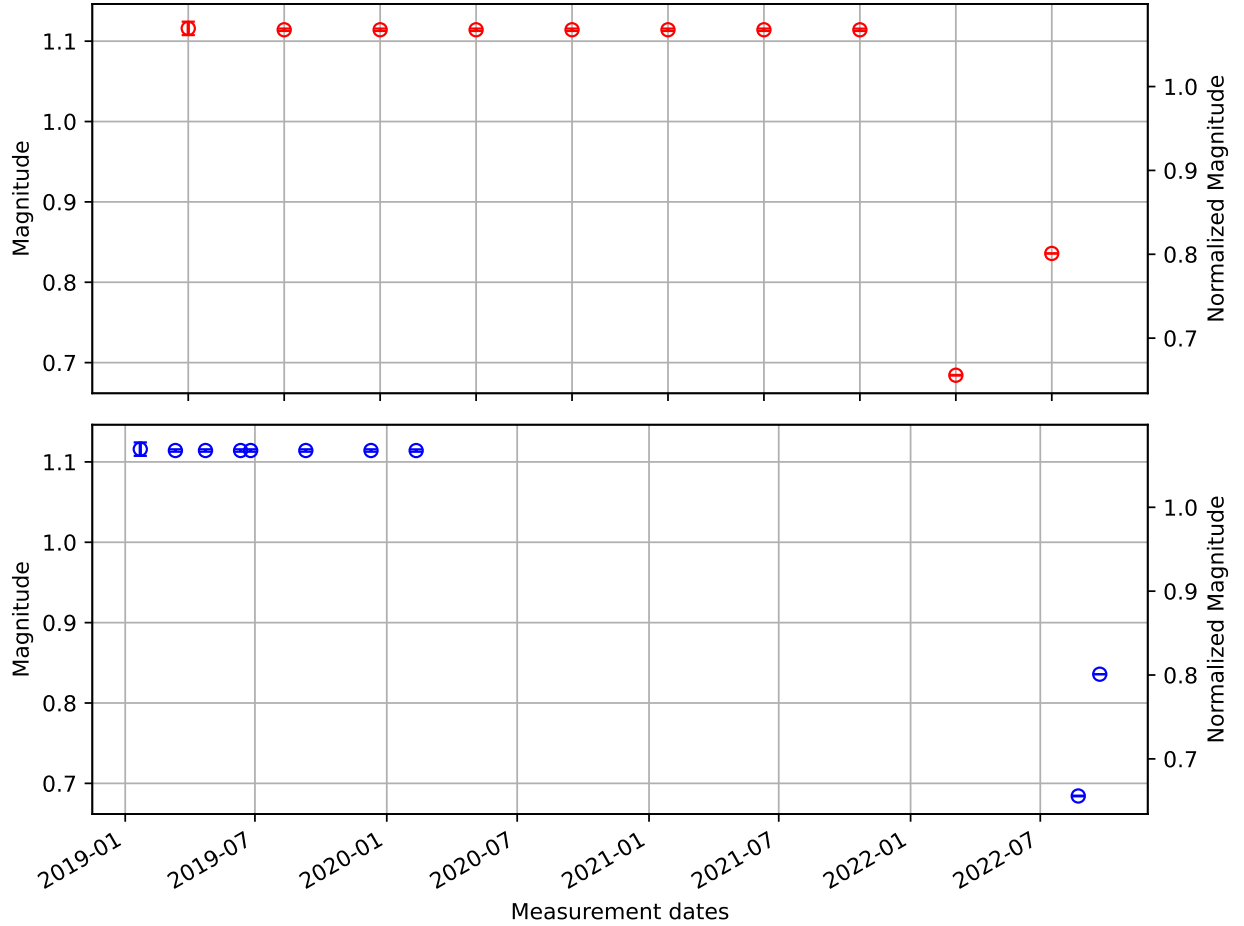
Mean value:	-7.857400
Standard deviation:	0.793284
Standard error:	0.264044
Relative Standard error:	0.033605

3 WS to GS Responsivity (α_{WG})

List of Measurements

Date	WSGS $\pm$ SE_WSGS	Normalized
D20190122	1.115889 $\pm$ 0.008376	(1 $\pm$ 0.007506)
D20190312	1.114181 $\pm$ 0.001526	(1 $\pm$ 0.001370)
D20190423	1.114181 $\pm$ 0.001526	(1 $\pm$ 0.001370)
D20190611	1.114181 $\pm$ 0.001526	(1 $\pm$ 0.001370)
D20190625	1.114181 $\pm$ 0.001526	(1 $\pm$ 0.001370)
D20190910	1.114181 $\pm$ 0.001526	(1 $\pm$ 0.001370)
D20191210	1.114181 $\pm$ 0.001526	(1 $\pm$ 0.001370)
D20200211	1.114124 $\pm$ 0.001493	(1 $\pm$ 0.001340)
D20220823	0.684296 $\pm$ 0.000443	(1 $\pm$ 0.000647)
D20220922	0.835839 $\pm$ 0.000074	(1 $\pm$ 0.000088)

WS to GS Responsivity



Summary of WS to GS Responsivity

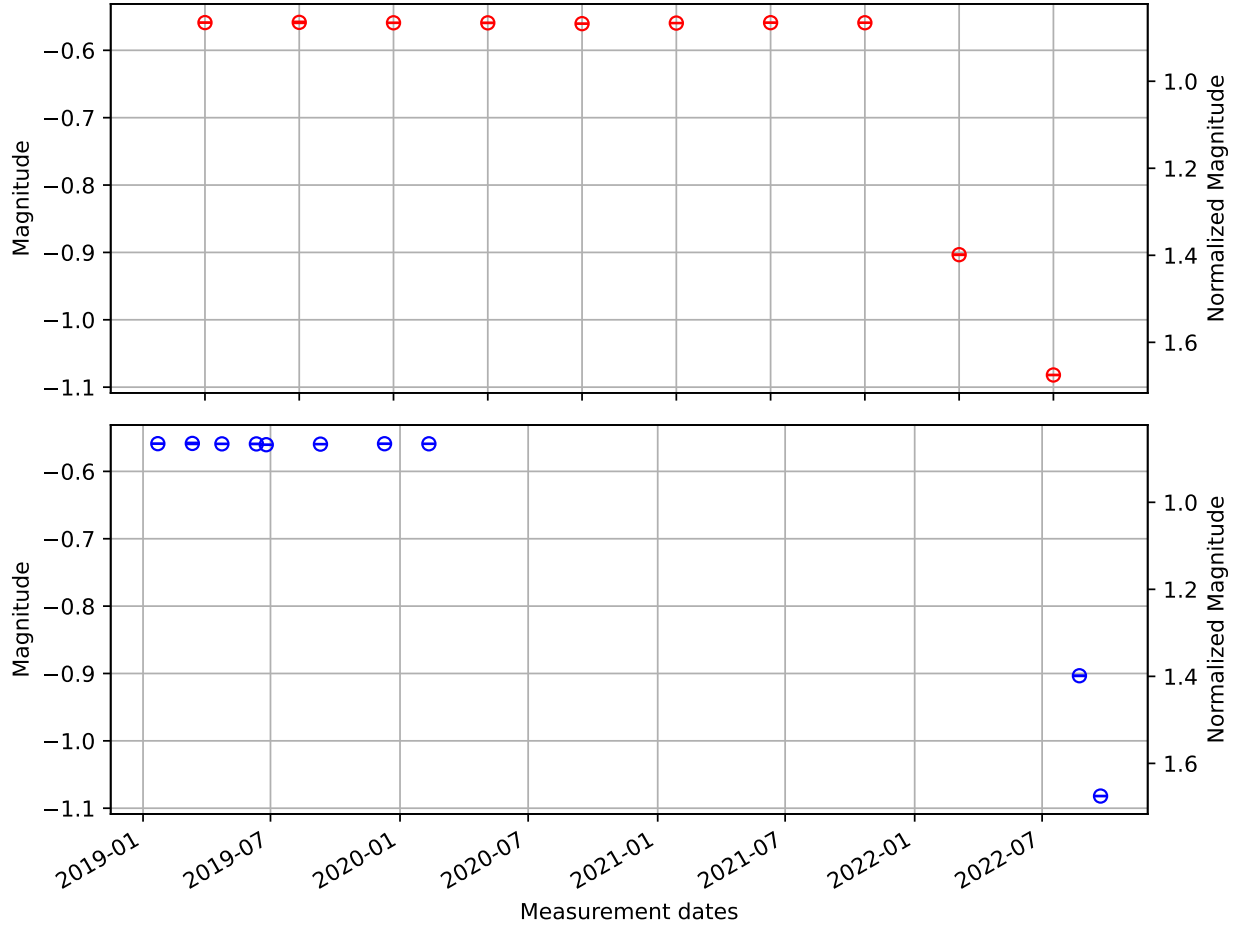
Mean value:	1.043523
Standard deviation:	0.153606
Standard error:	0.051128
Relative Standard error:	0.048995

4 TxPD to WS Responsivity (α_{TW})

List of Measurements

Date	TXWS $\pm$ SE_TXWS	Normalized
D20190122	-0.558870 $\pm$ 0.000346	(1 $\pm$ -0.000619)
D20190312	-0.558519 $\pm$ 0.001085	(1 $\pm$ -0.001942)
D20190423	-0.559161 $\pm$ 0.000332	(1 $\pm$ -0.000594)
D20190611	-0.559233 $\pm$ 0.000435	(1 $\pm$ -0.000778)
D20190625	-0.560432 $\pm$ 0.000336	(1 $\pm$ -0.000600)
D20190910	-0.559565 $\pm$ 0.000290	(1 $\pm$ -0.000519)
D20191210	-0.558977 $\pm$ 0.000344	(1 $\pm$ -0.000615)
D20200211	-0.559075 $\pm$ 0.000283	(1 $\pm$ -0.000506)
D20220823	-0.903365 $\pm$ 0.000579	(1 $\pm$ -0.000641)
D20220922	-1.081936 $\pm$ 0.000382	(1 $\pm$ -0.000353)

TxPD to GS Responsivity



Summary of TxPD to GS Responsivity

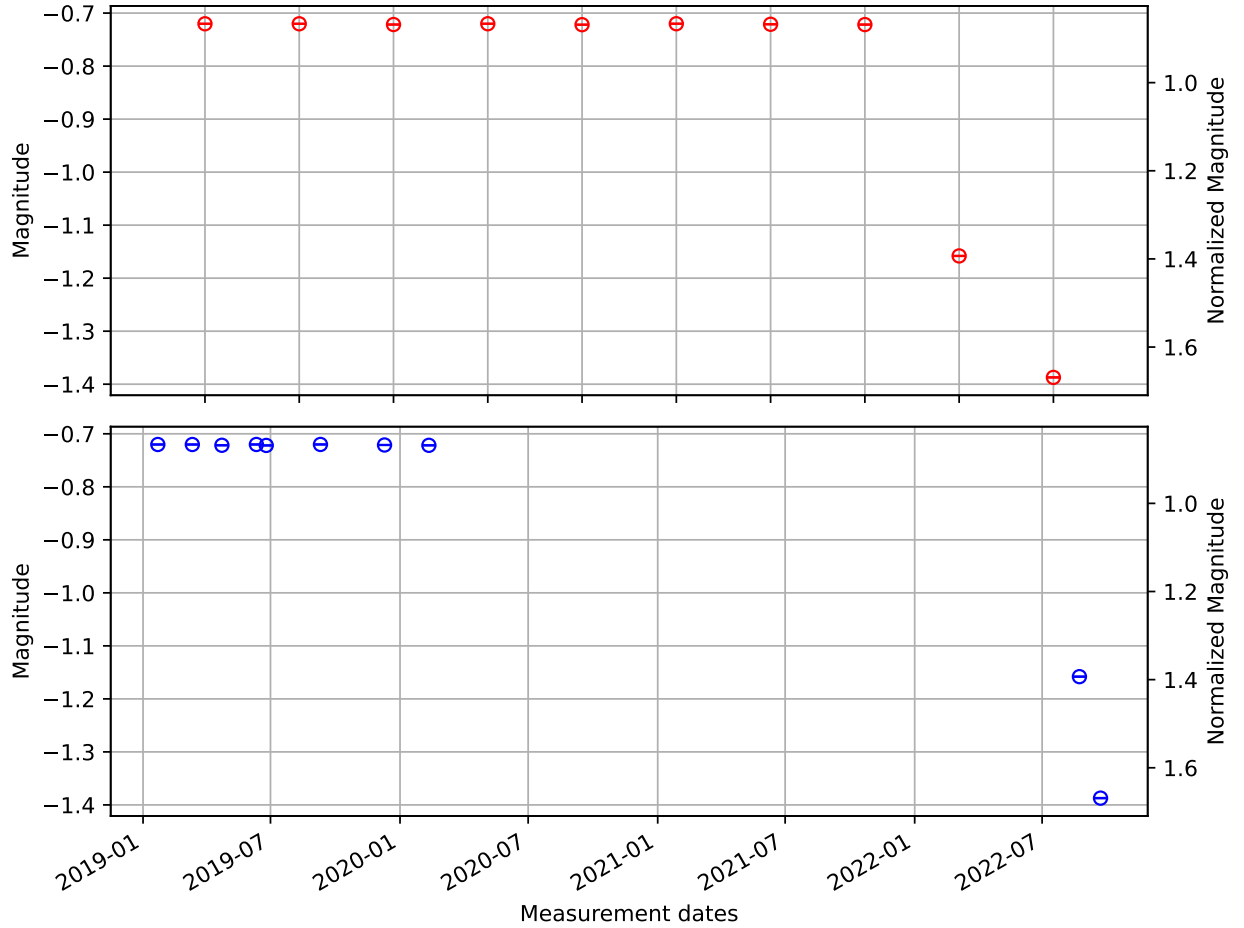
Mean value:	-0.645913
Standard deviation:	0.187531
Standard error:	0.062420
Relative Standard error:	0.096638

5 RxPD to WS Responsivity (α_{RW})

List of Measurements

Date	RXWS $\pm$ SE_RXWS	Normalized
D20190122	-0.720173 $\pm$ 0.000164	(1 $\pm$ -0.000227)
D20190312	-0.720198 $\pm$ 0.000174	(1 $\pm$ -0.000242)
D20190423	-0.721624 $\pm$ 0.000153	(1 $\pm$ -0.000212)
D20190611	-0.720124 $\pm$ 0.000167	(1 $\pm$ -0.000232)
D20190625	-0.721900 $\pm$ 0.000161	(1 $\pm$ -0.000222)
D20190910	-0.720076 $\pm$ 0.000143	(1 $\pm$ -0.000199)
D20191210	-0.721099 $\pm$ 0.000138	(1 $\pm$ -0.000192)
D20200211	-0.721702 $\pm$ 0.000181	(1 $\pm$ -0.000251)
D20220823	-1.158066 $\pm$ 0.000283	(1 $\pm$ -0.000245)
D20220922	-1.387206 $\pm$ 0.000310	(1 $\pm$ -0.000224)

RxPD to GS Responsivity



Summary of RxPD to GS Responsivity

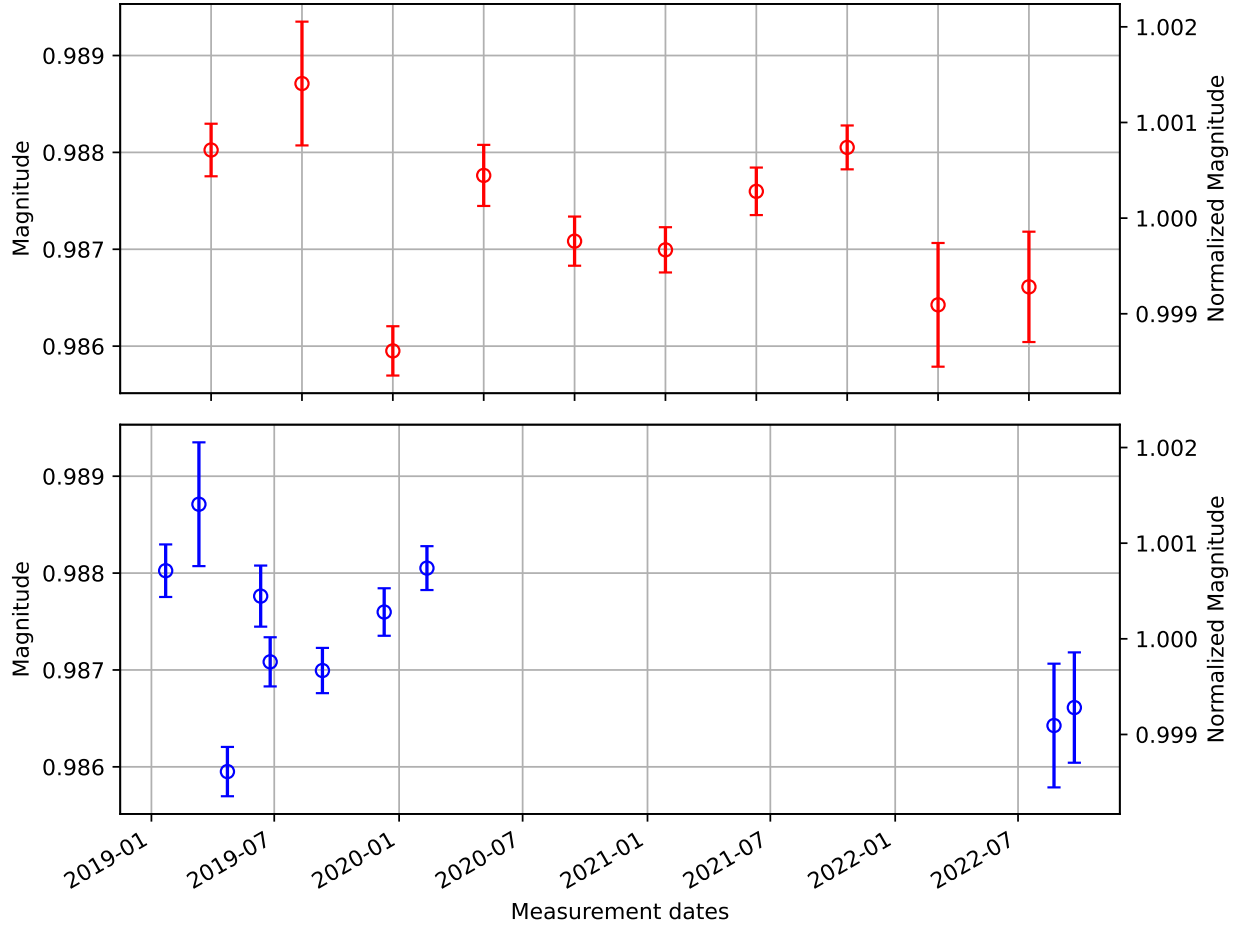
Mean value:	-0.831217
Standard deviation:	0.238836
Standard error:	0.079497
Relative Standard error:	0.095639

6 Optical Efficiency (e)

List of Measurements

Date	$e \pm SE_e$	Normalized
D20190122	0.988025 ± 0.000271	(1 ± 0.000275)
D20190312	0.988711 ± 0.000639	(1 ± 0.000646)
D20190423	0.985951 ± 0.000254	(1 ± 0.000258)
D20190611	0.987762 ± 0.000315	(1 ± 0.000319)
D20190625	0.987084 ± 0.000254	(1 ± 0.000257)
D20190910	0.986994 ± 0.000234	(1 ± 0.000237)
D20191210	0.987598 ± 0.000245	(1 ± 0.000248)
D20200211	0.988051 ± 0.000226	(1 ± 0.000229)
D20220823	0.986426 ± 0.000638	(1 ± 0.000647)
D20220922	0.986612 ± 0.000570	(1 ± 0.000577)

Optical Efficiency



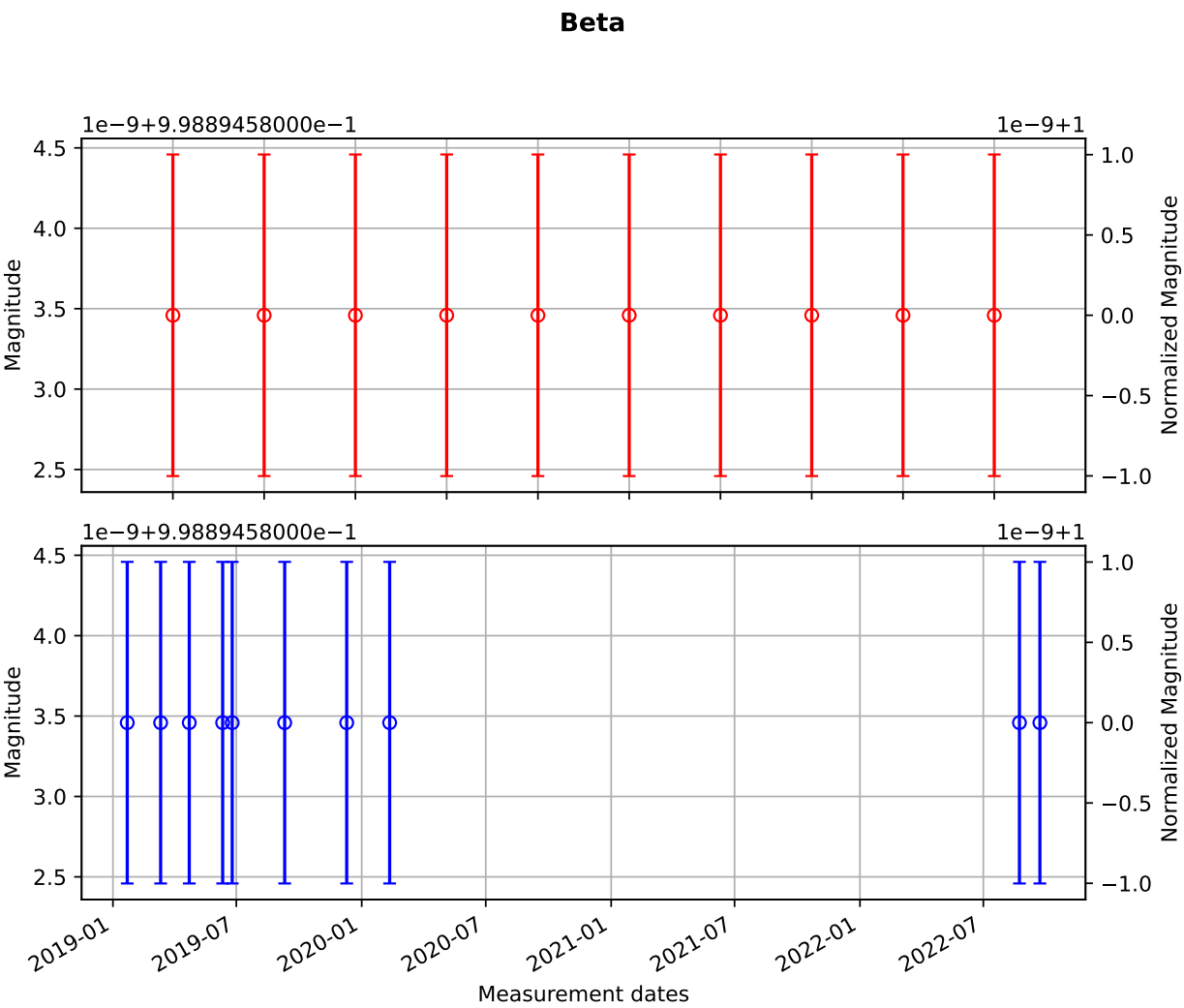
Summary of Optical Efficiency

Mean value:	0.987321
Standard deviation:	0.000855
Standard error:	0.000284
Relative Standard error:	0.000288

7 Beta (β)

List of Measurements

Date	beta $\pm$ SE_beta	Normalized
D20190122	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20190312	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20190423	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20190611	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20190625	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20190910	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20191210	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20200211	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20220823	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)
D20220922	0.998895 $\pm$ 0.000000	(1 $\pm$ 0.000000)



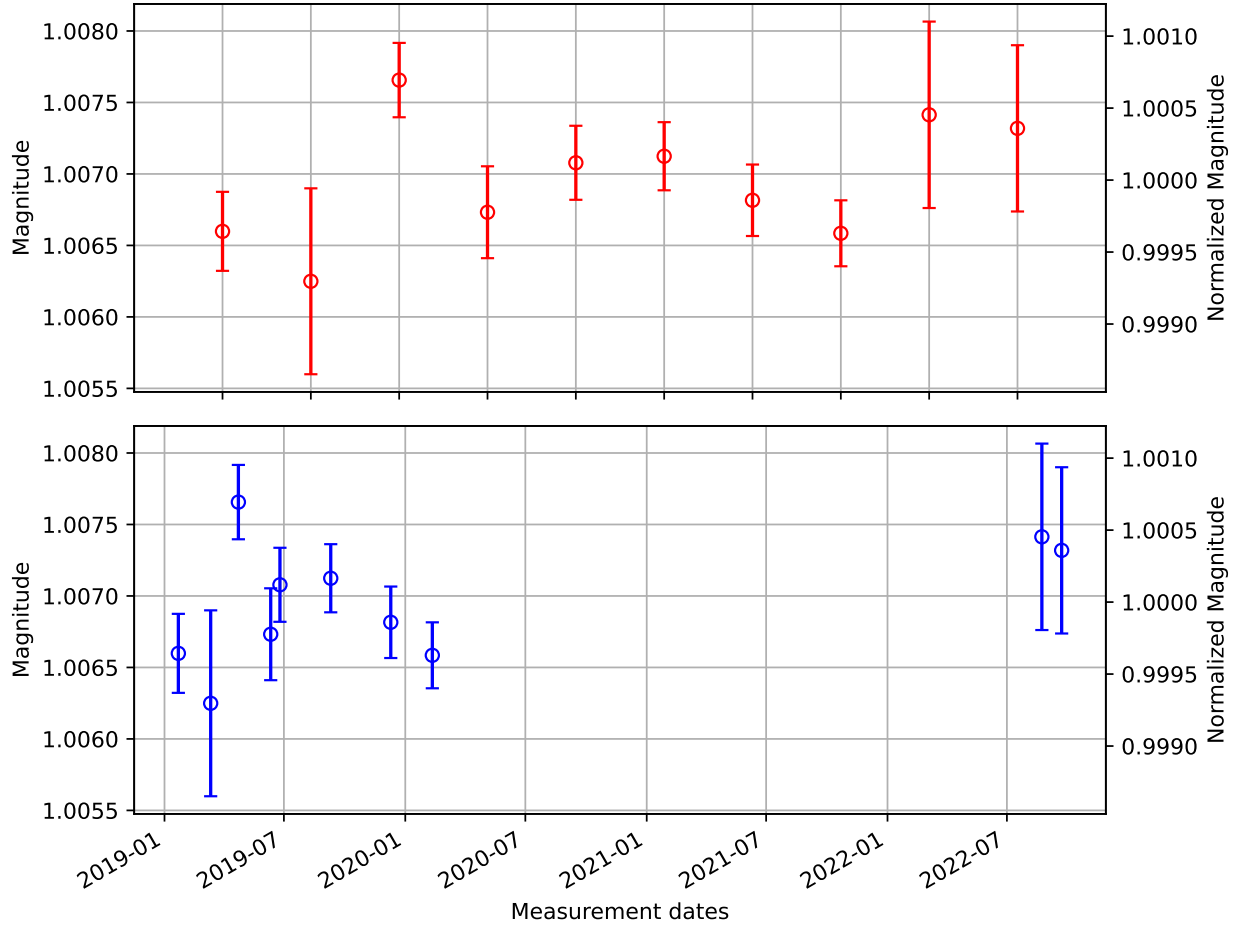
Summary of Beta		
	Mean value:	0.998895
	Standard deviation:	0.000000
	Standard error:	0.000000
	Relative Standard error:	0.000000

8 Input Optical efficiency factor ($\mathcal{E}_T$)

List of Measurements

Date	$E_T \pm SE_{E_T}$	Normalized
D20190122	1.006599 ± 0.000276	(1 ± 0.000275)
D20190312	1.006249 ± 0.000650	(1 ± 0.000646)
D20190423	1.007657 ± 0.000260	(1 ± 0.000258)
D20190611	1.006732 ± 0.000321	(1 ± 0.000319)
D20190625	1.007078 ± 0.000259	(1 ± 0.000257)
D20190910	1.007124 ± 0.000238	(1 ± 0.000237)
D20191210	1.006816 ± 0.000250	(1 ± 0.000248)
D20200211	1.006585 ± 0.000231	(1 ± 0.000229)
D20220823	1.007414 ± 0.000652	(1 ± 0.000647)
D20220922	1.007319 ± 0.000581	(1 ± 0.000577)

Input Side Optical Efficiency factor



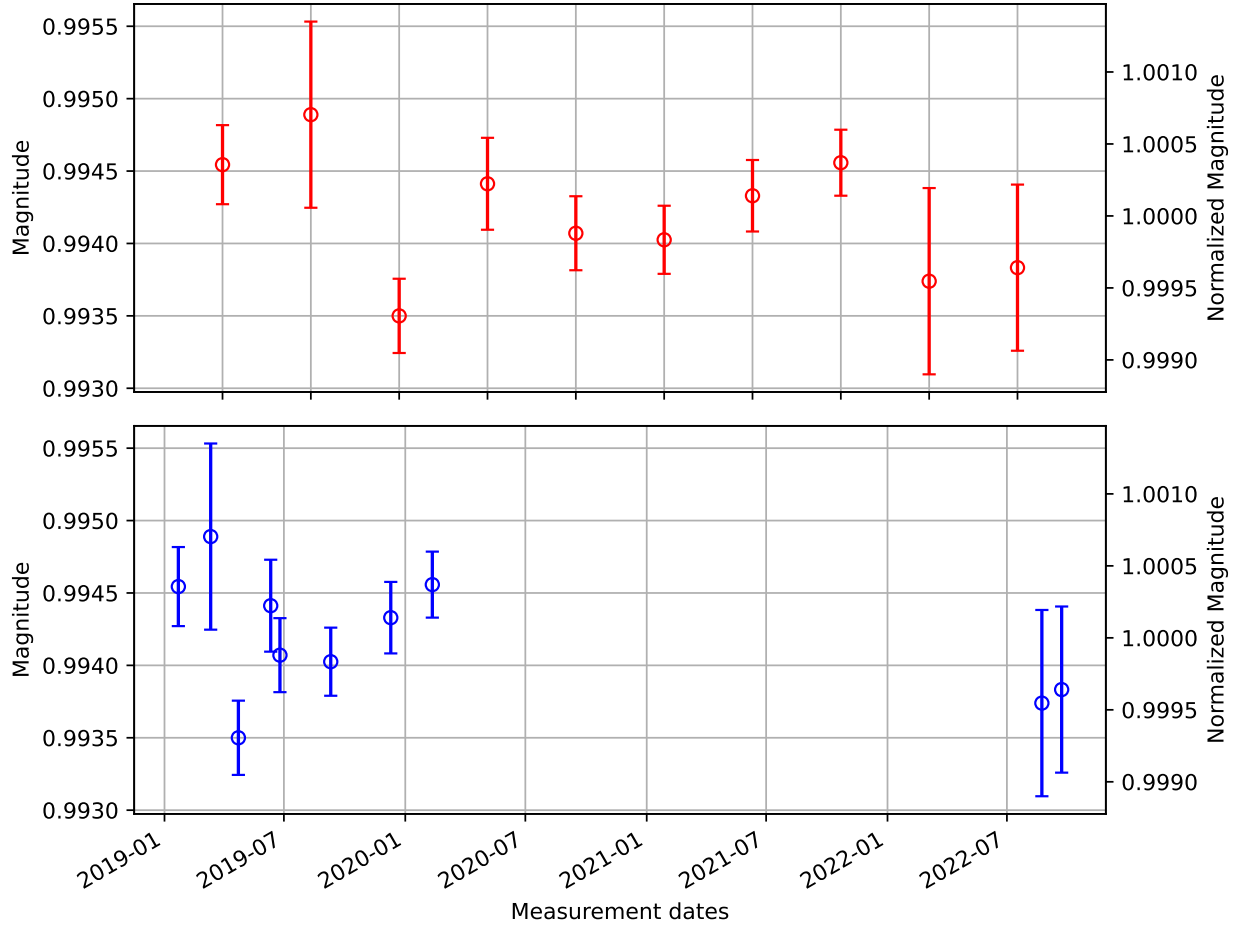
Summary of Input Side Optical Efficiency factor		
Mean value:	1.006957	
Standard deviation:	0.000436	
Standard error:	0.000145	
Relative Standard error:	0.000144	

9 Output Optical efficiency factor ($\mathcal{E}_R$)

List of Measurements

Date	E_R $\pm$ SE_E_R	Normalized
D20190122	0.994544 $\pm$ 0.000273	(1 $\pm$ 0.000275)
D20190312	0.994889 $\pm$ 0.000643	(1 $\pm$ 0.000646)
D20190423	0.993500 $\pm$ 0.000256	(1 $\pm$ 0.000258)
D20190611	0.994412 $\pm$ 0.000317	(1 $\pm$ 0.000319)
D20190625	0.994071 $\pm$ 0.000256	(1 $\pm$ 0.000257)
D20190910	0.994025 $\pm$ 0.000235	(1 $\pm$ 0.000237)
D20191210	0.994329 $\pm$ 0.000247	(1 $\pm$ 0.000248)
D20200211	0.994558 $\pm$ 0.000228	(1 $\pm$ 0.000229)
D20220823	0.993739 $\pm$ 0.000643	(1 $\pm$ 0.000647)
D20220922	0.993833 $\pm$ 0.000574	(1 $\pm$ 0.000577)

Output Side Optical Efficiency factor



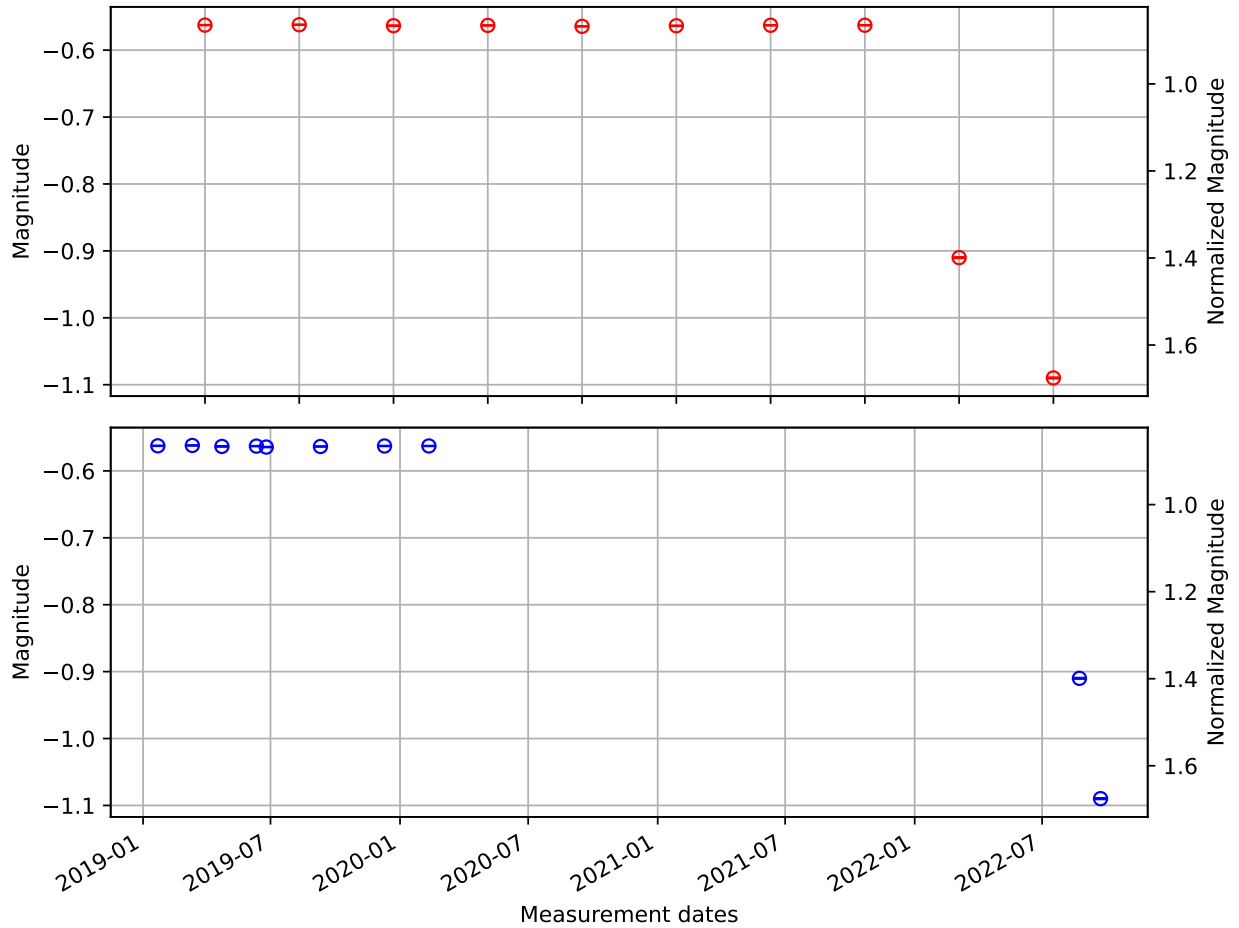
Summary of Output Side Optical Efficiency factor		
Mean value:	0.994190	
Standard deviation:	0.000430	
Standard error:	0.000143	
Relative Standard error:	0.000144	

10 TxPD to WS prime ($\alpha_{TW'}$)

List of Measurements

Date	alphaTXWS_prime $\pm$ SE_alphaTXWS_prime		
Normalized			
D20190122	-0.562558 $\pm$ -0.000247	(1 $\pm$ 0.000439)	
D20190312	-0.562010 $\pm$ -0.000289	(1 $\pm$ 0.000514)	
D20190423	-0.563442 $\pm$ -0.000479	(1 $\pm$ 0.000851)	
D20190611	-0.562998 $\pm$ -0.000268	(1 $\pm$ 0.000476)	
D20190625	-0.564399 $\pm$ -0.000329	(1 $\pm$ 0.000584)	
D20190910	-0.563551 $\pm$ -0.000338	(1 $\pm$ 0.000600)	
D20191210	-0.562787 $\pm$ -0.000275	(1 $\pm$ 0.000489)	
D20200211	-0.562756 $\pm$ -0.000242	(1 $\pm$ 0.000430)	
D20220823	-0.910062 $\pm$ -0.000719	(1 $\pm$ 0.000790)	
D20220922	-1.089855 $\pm$ -0.000801	(1 $\pm$ 0.000735)	

TxPD to WS prime



Summary of TxPD to WS prime

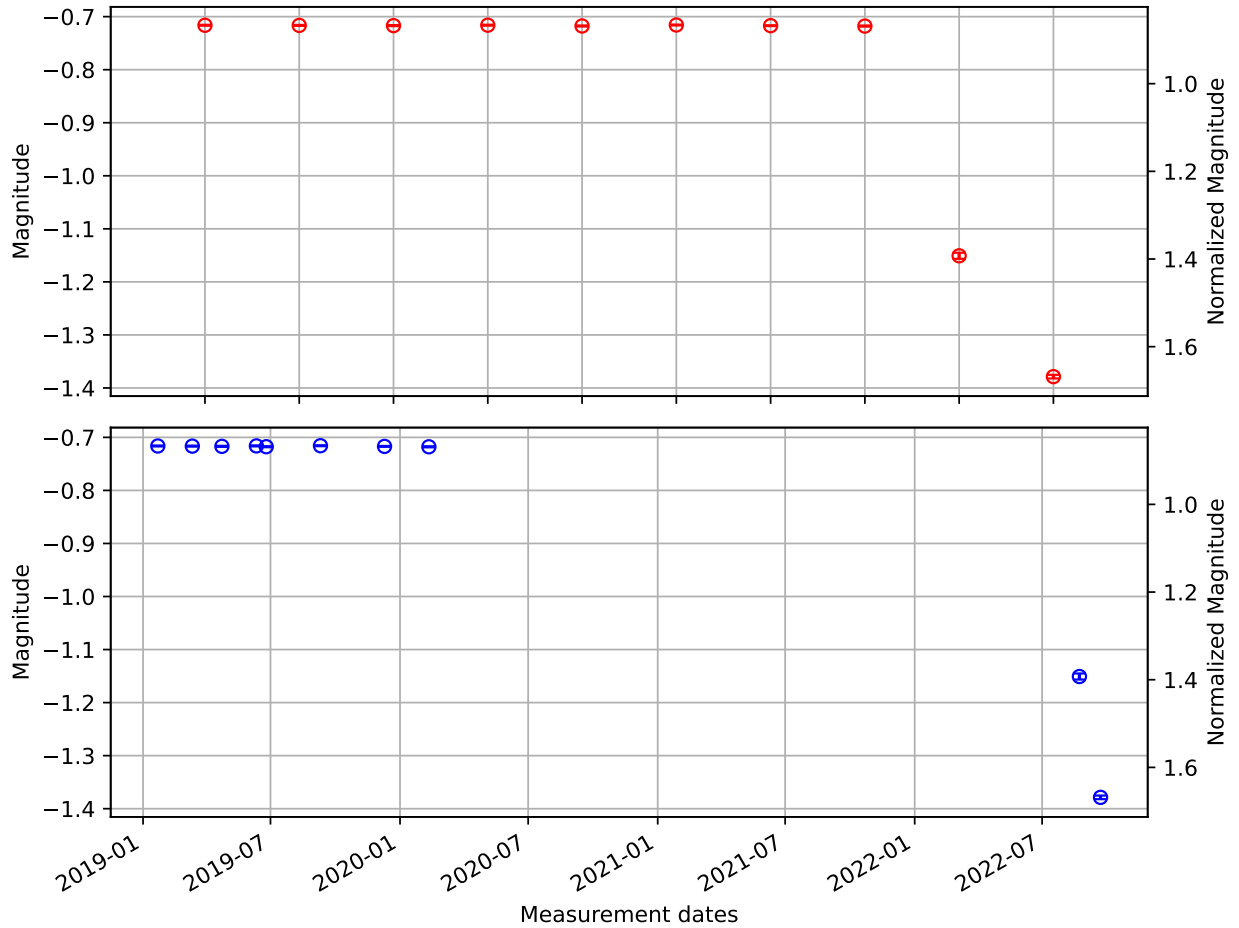
Mean value:	-0.650442
Standard deviation:	0.189024
Standard error:	0.062917
Relative Standard error:	0.096729

11 RxPD to WS prime (α_{RW}')

List of Measurements

Date	alphaRXWS_prime $\pm$ SE_alphaRXWS_prime		
Normalized			
D20190122	-0.716244 $\pm$ -0.000914	(1 $\pm$ 0.001276)	
D20190312	-0.716517 $\pm$ -0.000941	(1 $\pm$ 0.001314)	
D20190423	-0.716933 $\pm$ -0.000985	(1 $\pm$ 0.001374)	
D20190611	-0.716100 $\pm$ -0.000956	(1 $\pm$ 0.001335)	
D20190625	-0.717619 $\pm$ -0.000979	(1 $\pm$ 0.001364)	
D20190910	-0.715774 $\pm$ -0.000881	(1 $\pm$ 0.001231)	
D20191210	-0.717010 $\pm$ -0.000805	(1 $\pm$ 0.001122)	
D20200211	-0.717774 $\pm$ -0.001049	(1 $\pm$ 0.001461)	
D20220823	-1.150816 $\pm$ -0.005742	(1 $\pm$ 0.004989)	
D20220922	-1.378651 $\pm$ -0.003430	(1 $\pm$ 0.002488)	

RxPD to WS prime



Summary of RxPD to WS prime

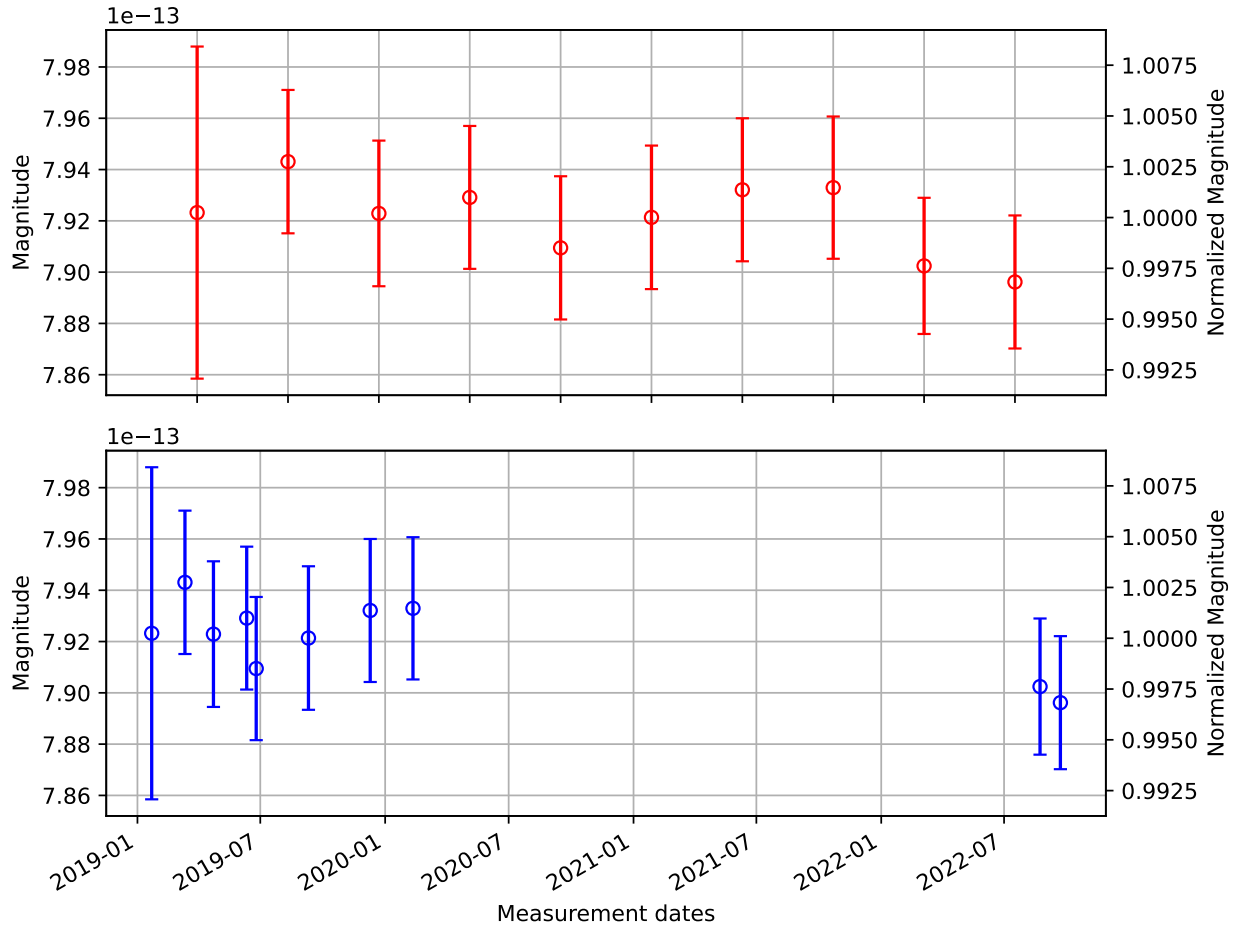
Mean value:	-0.826344
Standard deviation:	0.237211
Standard error:	0.078956
Relative Standard error:	0.095548

12 TxPD Force Coefficient (Γ_{TX})

List of Measurements

Date	FC_TXPD $\pm$ SE_FC_TXPD	Normalized
D20190122	7.923220e-13 $\pm$ 6.474621e-15	(1 $\pm$ 8.171704e-03)
D20190312	7.943089e-13 $\pm$ 2.795314e-15	(1 $\pm$ 3.519178e-03)
D20190423	7.922894e-13 $\pm$ 2.839416e-15	(1 $\pm$ 3.583812e-03)
D20190611	7.929139e-13 $\pm$ 2.786075e-15	(1 $\pm$ 3.513716e-03)
D20190625	7.909468e-13 $\pm$ 2.792022e-15	(1 $\pm$ 3.529975e-03)
D20190910	7.921367e-13 $\pm$ 2.798435e-15	(1 $\pm$ 3.532768e-03)
D20191210	7.932114e-13 $\pm$ 2.788538e-15	(1 $\pm$ 3.515505e-03)
D20200211	7.932952e-13 $\pm$ 2.773637e-15	(1 $\pm$ 3.496349e-03)
D20220823	7.902438e-13 $\pm$ 2.654863e-15	(1 $\pm$ 3.359549e-03)
D20220922	7.896166e-13 $\pm$ 2.593935e-15	(1 $\pm$ 3.285056e-03)

TxPD Force Coefficient



Summary of TxPD Force Coefficient

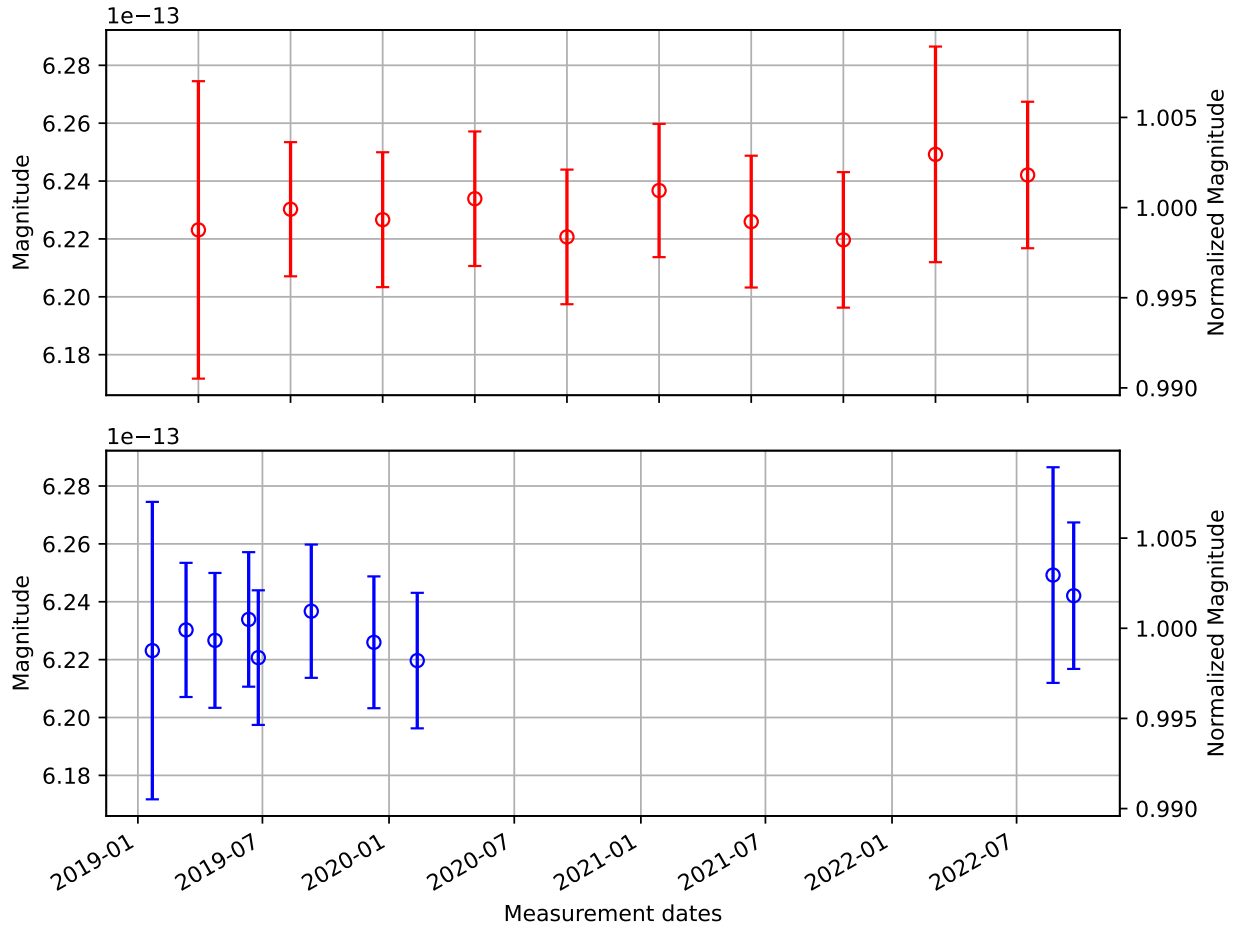
Mean value:	7.921285e-13
Standard deviation:	1.461605e-15
Standard error:	4.864944e-16
Relative Standard error:	6.141609e-04

13 RxPD Force Coefficient (Γ_{RX})

List of Measurements

Date	FC_RXPD $\pm$ SE_FC_RXPD	Normalized
D20190122	6.223119e-13 $\pm$ 5.139667e-15	(1 $\pm$ 8.258989e-03)
D20190312	6.230266e-13 $\pm$ 2.318319e-15	(1 $\pm$ 3.721060e-03)
D20190423	6.226650e-13 $\pm$ 2.330520e-15	(1 $\pm$ 3.742815e-03)
D20190611	6.233895e-13 $\pm$ 2.324452e-15	(1 $\pm$ 3.728730e-03)
D20190625	6.220698e-13 $\pm$ 2.325999e-15	(1 $\pm$ 3.739129e-03)
D20190910	6.236738e-13 $\pm$ 2.303034e-15	(1 $\pm$ 3.692689e-03)
D20191210	6.225986e-13 $\pm$ 2.277312e-15	(1 $\pm$ 3.657753e-03)
D20200211	6.219669e-13 $\pm$ 2.341568e-15	(1 $\pm$ 3.764780e-03)
D20220823	6.249224e-13 $\pm$ 3.726253e-15	(1 $\pm$ 5.962745e-03)
D20220922	6.242097e-13 $\pm$ 2.531082e-15	(1 $\pm$ 4.054858e-03)

RxPD Force Coefficient



Summary of RxPD Force Coefficient

Mean value:	6.230834e-13
Standard deviation:	9.646830e-16
Standard error:	3.210942e-16
Relative Standard error:	5.153310e-04