RxPD and TxPD Calibration Trends

GENERATED FOR LHO_EndX

Report Generated on December 11, 2019

Contents

1 About

This document contains the Pcal PD (TxPD and RxPD) Calibration trends. The first six sections contain the six ratios measured at the end-station labeled as m1, m2 ……m6. The section that follows contains the relevant information calculated from these measurements which include Optical Efficiency, Power Imbalance, TX/WS and RX/WS ratio.

Understanding Each Section

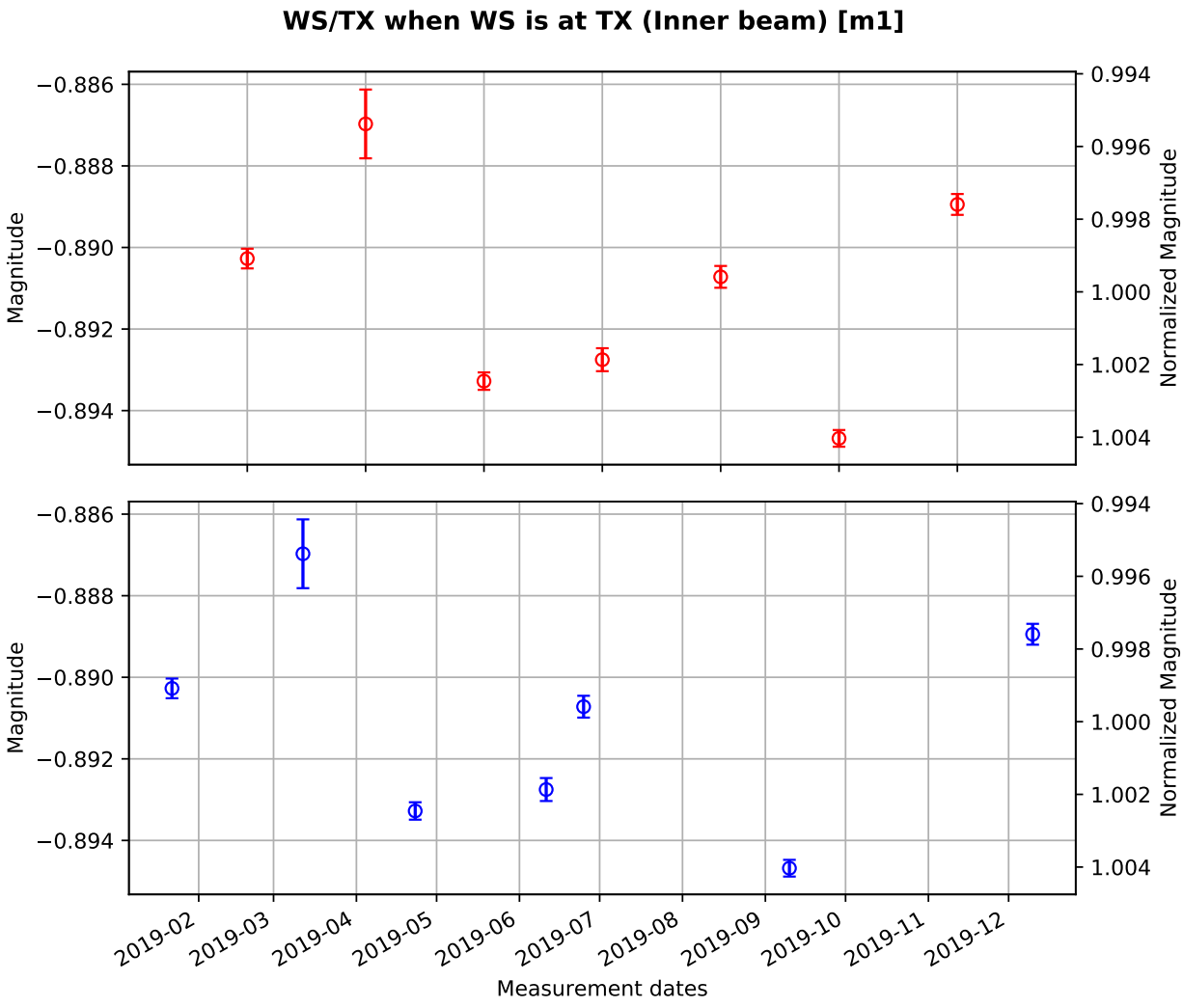
Each section contains a list of measurements with Magnitude, Standard Error (Std Err) and Relative Error (Rel Err) for each measurement. The list is followed by two plot figures with Magnitude on the first plot and the the Normalized Magnitude on the second. Each section ends with a summary that contains the weighted mean of all the measurement along with their Standard Deviation (Std Dev), Std Err and Rel Err where each of these terms are defined as:

```
Mean = sum(x(i)*w(i))/sum(w(i))
Std Dev = sqrt(sum(w(i)*(x(i)-x_mean)^2)/((n-1)/n*sum(w(i))))
Std Err = Std Dev/sqrt(n)
Rel Err = Std Err/Mean
```

2 WS/TX Ratio when WS is at TX (Inner Beam)

List of Measurements

Date	m1 ± SE_m1	Normalized
D20190122	-0.890272 ± 0.000242	(1 ± 0.000271)
D20190312	-0.886971 ± 0.000843	(1 ± 0.000951)
D20190423	-0.893277 ± 0.000214	(1 ± 0.000239)
D20190611	-0.892752 ± 0.000282	(1 ± 0.000315)
D20190625	-0.890721 ± 0.000267	(1 ± 0.000300)
D20190910	-0.894681 ± 0.000205	(1 ± 0.000229)
D20191210	-0.888945 ± 0.000256	(1 ± 0.000288)



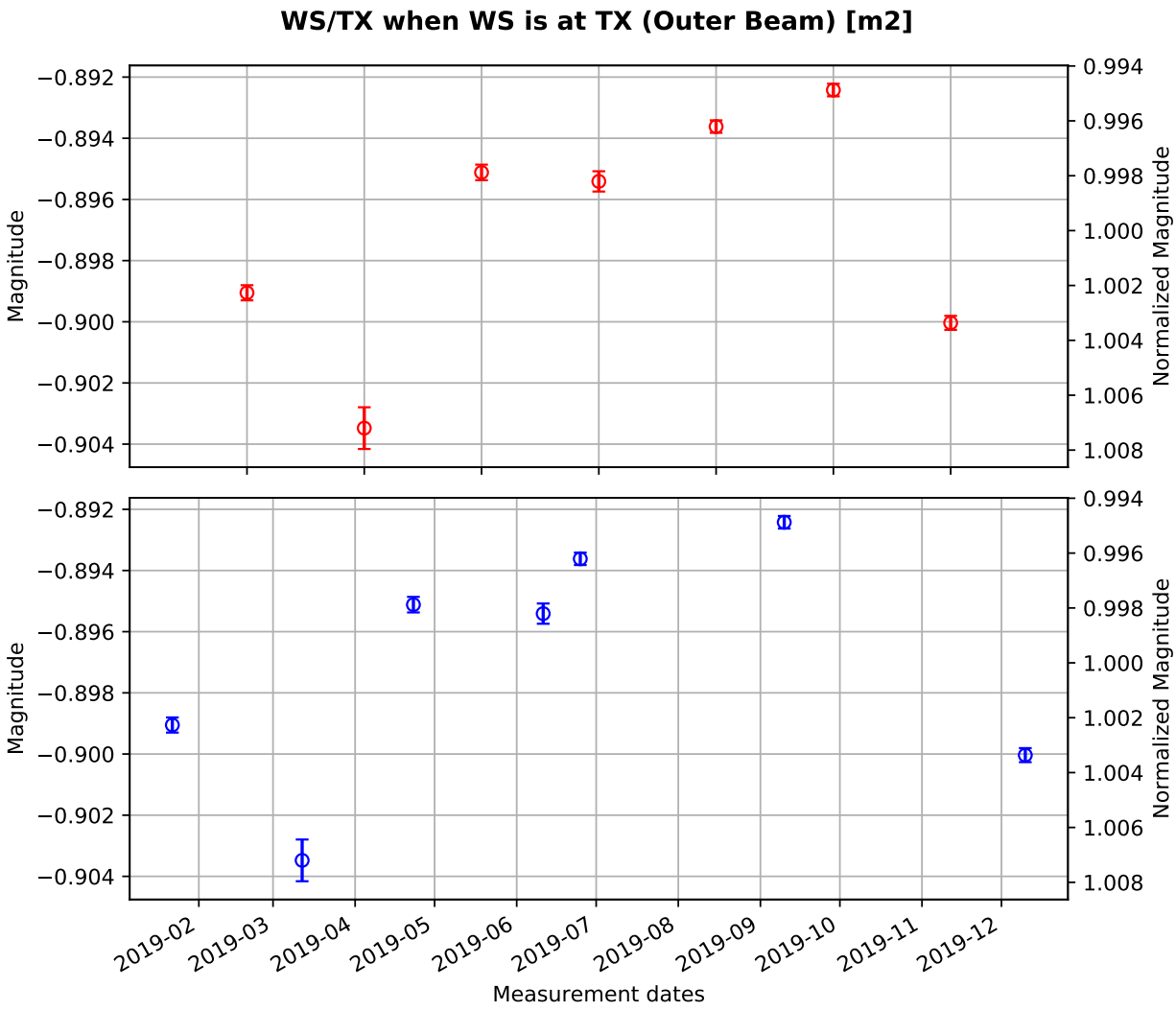
Summary of WS/TX when WS is at TX (Inner beam) [m1]

Mean value:	-0.891089
Standard deviation:	0.002671
Standard error:	0.001087
Relative Standard error:	0.001220

3 WS/TX Ratio when WS is at TX (Outer Beam)

List of Measurements

Date	m2 ± SE_m2	Normalized
D20190122	-0.899052 ± 0.000248	(1 ± 0.000275)
D20190312	-0.903477 ± 0.000682	(1 ± 0.000755)
D20190423	-0.895117 ± 0.000254	(1 ± 0.000284)
D20190611	-0.895410 ± 0.000331	(1 ± 0.000370)
D20190625	-0.893618 ± 0.000204	(1 ± 0.000228)
D20190910	-0.892423 ± 0.000206	(1 ± 0.000230)
D20191210	-0.900036 ± 0.000230	(1 ± 0.000255)



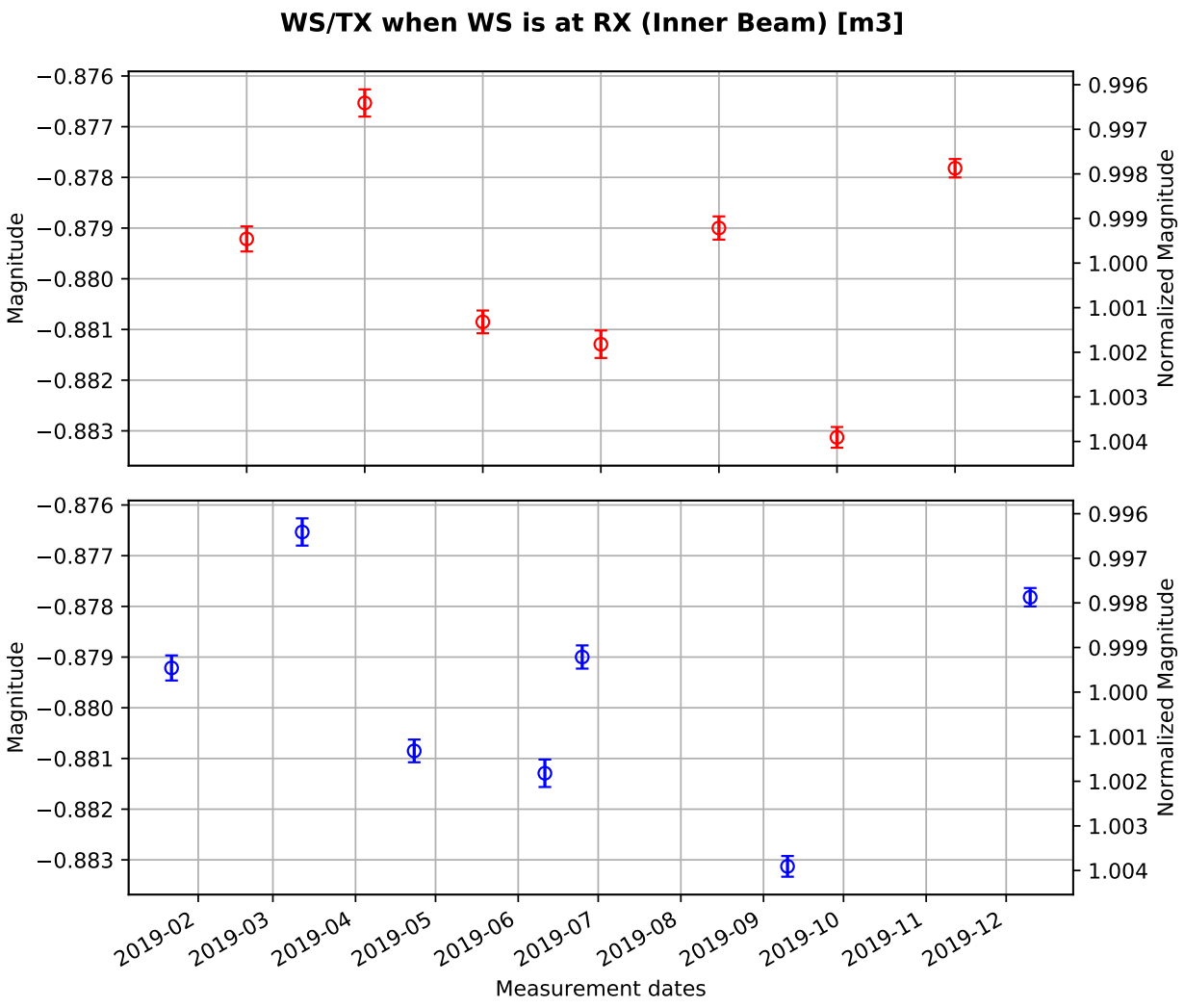
Summary of WS/TX when WS is at TX (Outer Beam) [m2]

Mean value:	-0.897019
Standard deviation:	0.003955
Standard error:	0.001609
Relative Standard error:	0.001794

4 WS/TX Ratio when WS is at RX (Inner Beam)

List of Measurements

Date	m3 ± SE_m3	Normalized
D20190122	-0.879214 ± 0.000247	(1 ± 0.000281)
D20190312	-0.876532 ± 0.000269	(1 ± 0.000307)
D20190423	-0.880851 ± 0.000224	(1 ± 0.000255)
D20190611	-0.881291 ± 0.000271	(1 ± 0.000307)
D20190625	-0.878999 ± 0.000229	(1 ± 0.000260)
D20190910	-0.883128 ± 0.000204	(1 ± 0.000231)
D20191210	-0.877819 ± 0.000182	(1 ± 0.000207)

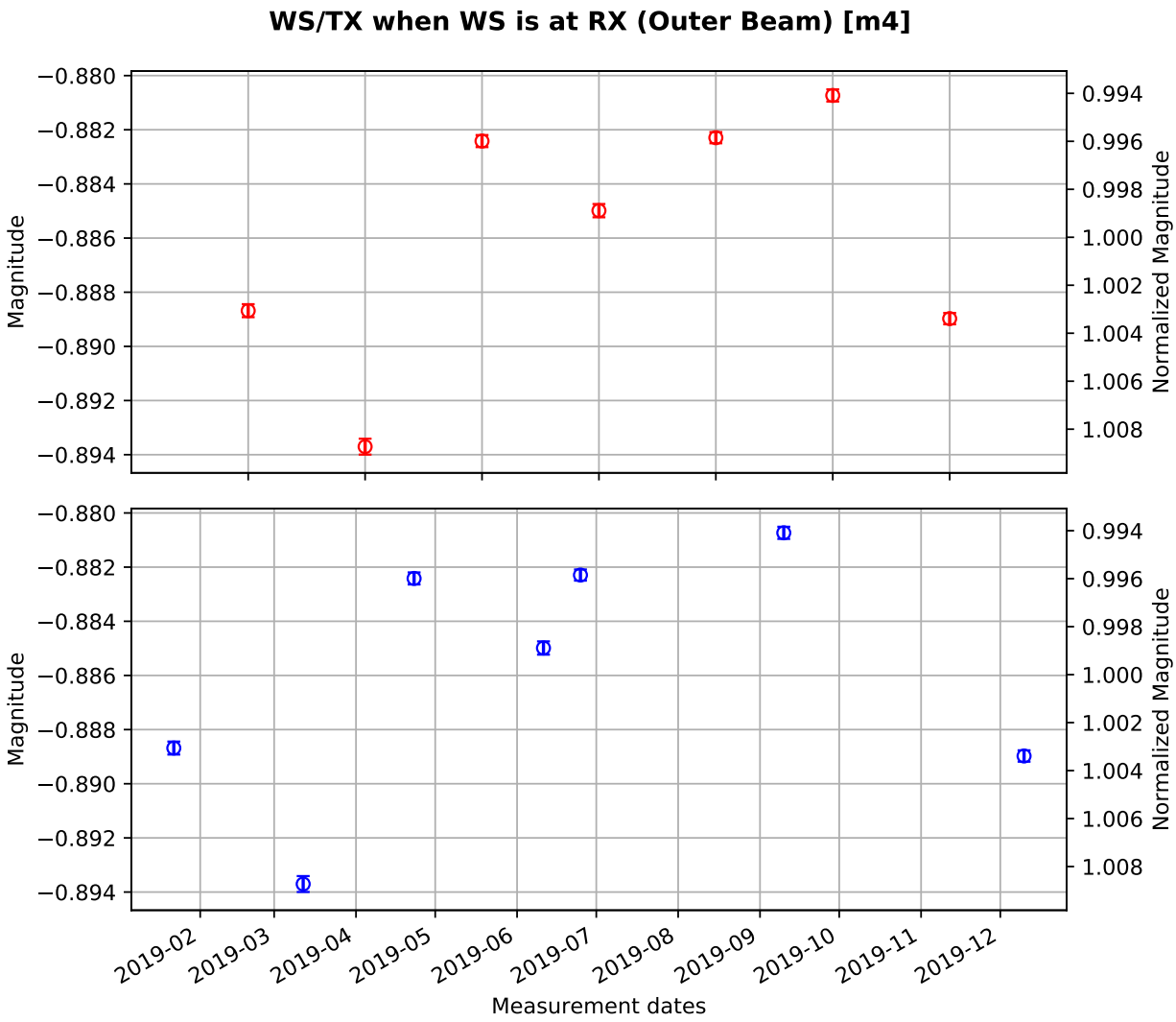


Summary of WS/TX when WS is at RX (Inner Beam) [m3]	
Mean value:	-0.879691
Standard deviation:	0.002233
Standard error:	0.000909
Relative Standard error:	0.001033

5 WS/TX Ratio when WS is at RX (Inner Beam)

List of Measurements

Date	m4 ± SE_m4	Normalized
D20190122	-0.888682 ± 0.000240	(1 ± 0.000270)
D20190312	-0.893703 ± 0.000294	(1 ± 0.000328)
D20190423	-0.882418 ± 0.000223	(1 ± 0.000252)
D20190611	-0.884988 ± 0.000245	(1 ± 0.000277)
D20190625	-0.882293 ± 0.000206	(1 ± 0.000233)
D20190910	-0.880733 ± 0.000224	(1 ± 0.000255)
D20191210	-0.888975 ± 0.000210	(1 ± 0.000237)



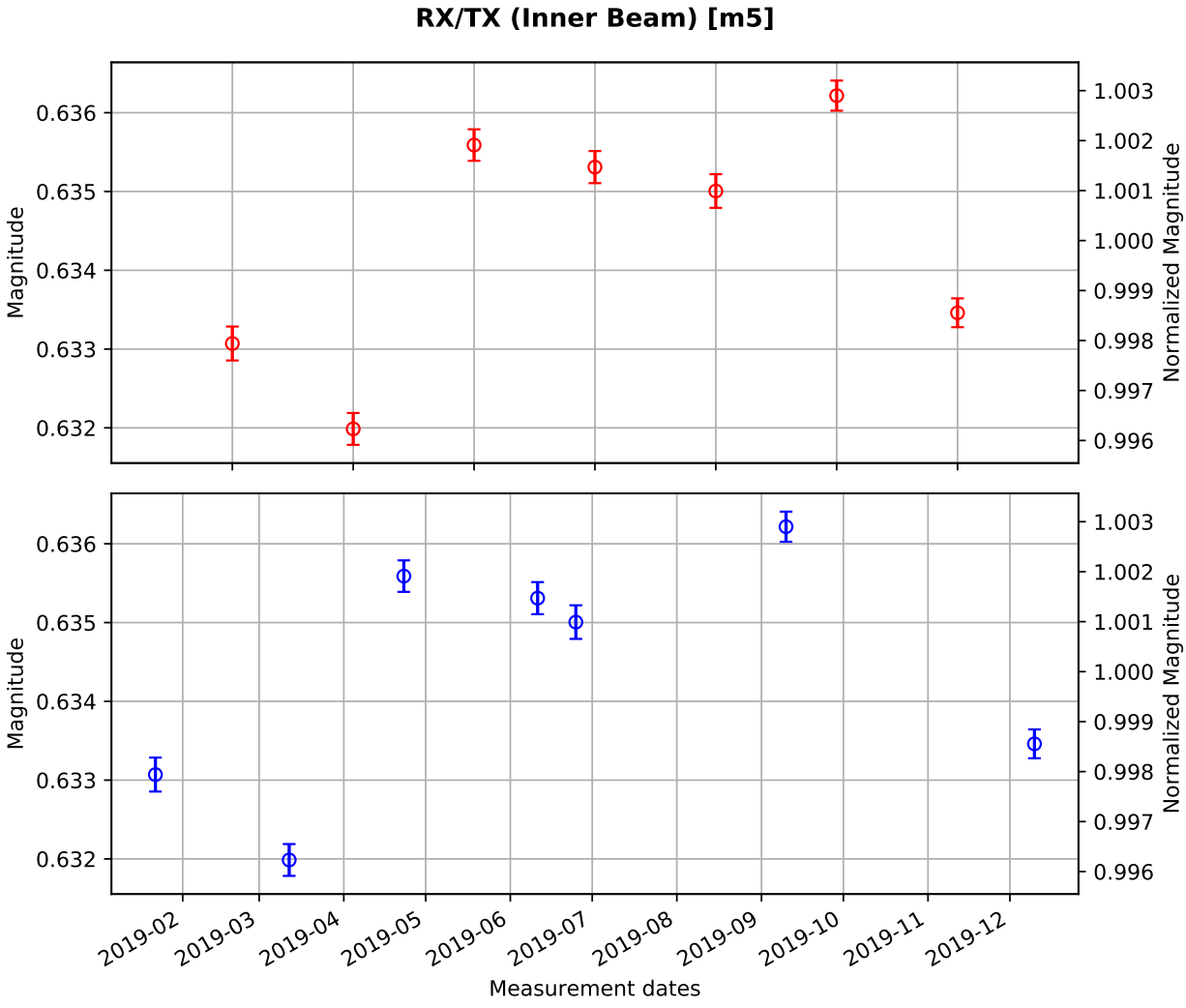
Summary of WS/TX when WS is at RX (Outer Beam) [m4]

Mean value:	-0.885970
Standard deviation:	0.004668
Standard error:	0.001900
Relative Standard error:	0.002144

6 RX/TX Ratio (Inner Beam)

List of Measurements

Date	m5 ± SE_m5	Normalized
D20190122	0.633071 ± 0.000216	(1 ± 0.000341)
D20190312	0.631987 ± 0.000202	(1 ± 0.000320)
D20190423	0.635590 ± 0.000200	(1 ± 0.000314)
D20190611	0.635310 ± 0.000204	(1 ± 0.000321)
D20190625	0.635006 ± 0.000213	(1 ± 0.000336)
D20190910	0.636217 ± 0.000191	(1 ± 0.000301)
D20191210	0.633461 ± 0.000183	(1 ± 0.000289)



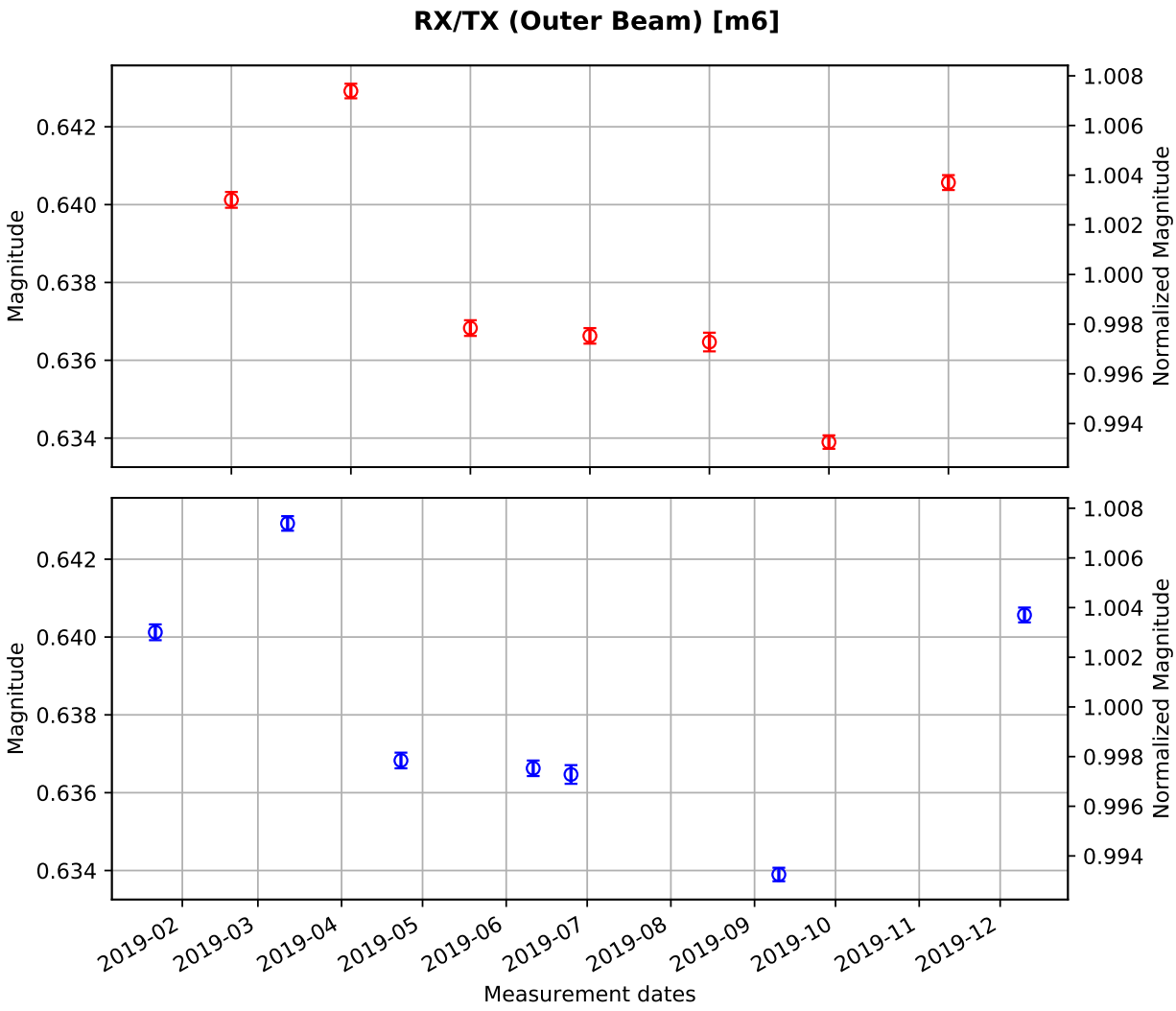
Summary of RX/TX (Inner Beam) [m5]

Mean value:	0.634377
Standard deviation:	0.001548
Standard error:	0.000630
Relative Standard error:	0.000993

7 RX/TX Ratio (Outer Beam)

List of Measurements

Date	m6 ± SE_m6	Normalized
D20190122	0.640122 ± 0.000203	(1 ± 0.000317)
D20190312	0.642919 ± 0.000187	(1 ± 0.000291)
D20190423	0.636828 ± 0.000201	(1 ± 0.000316)
D20190611	0.636627 ± 0.000200	(1 ± 0.000313)
D20190625	0.636468 ± 0.000240	(1 ± 0.000377)
D20190910	0.633898 ± 0.000173	(1 ± 0.000273)
D20191210	0.640567 ± 0.000191	(1 ± 0.000298)



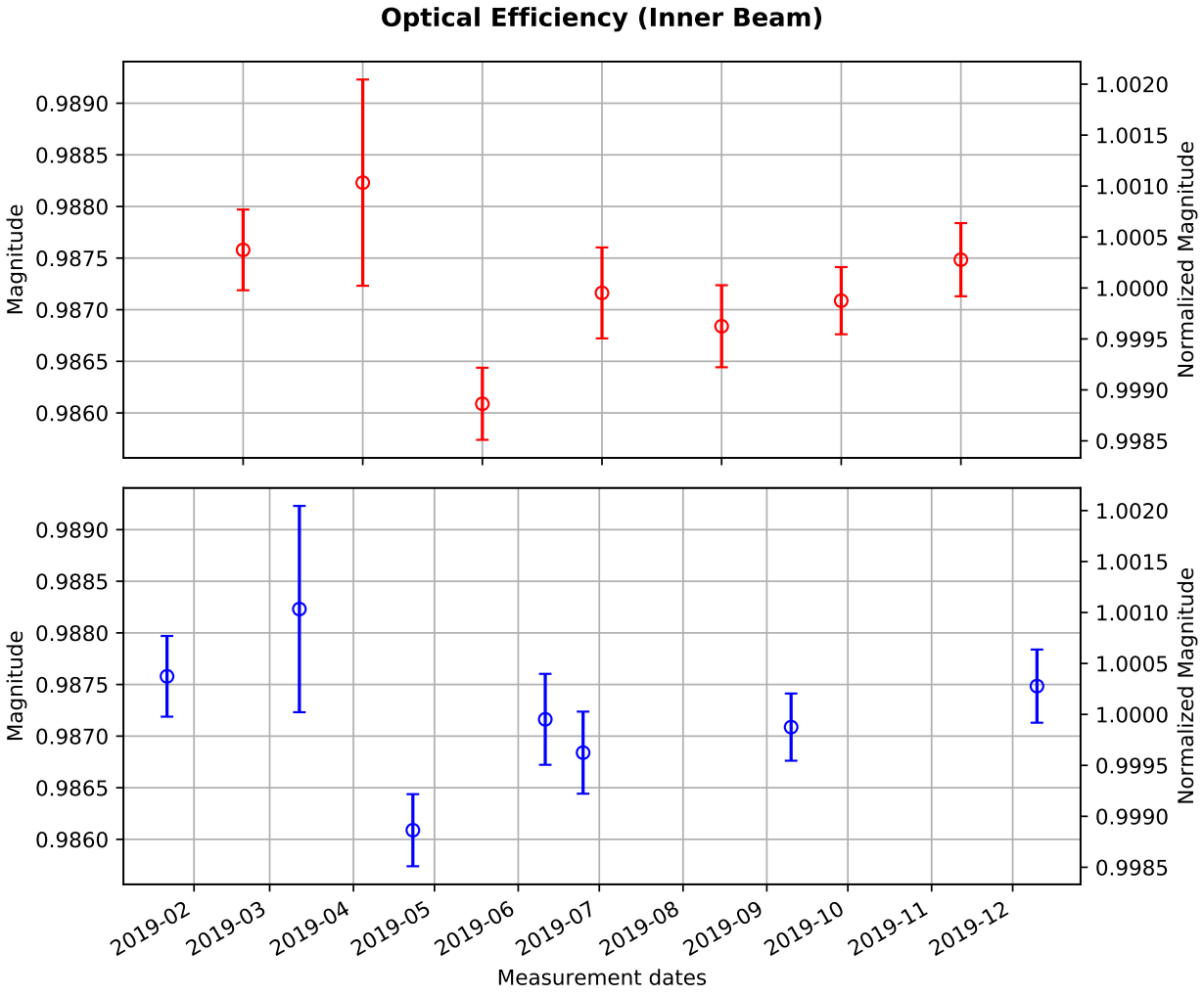
Summary of RX/TX (Outer Beam) [m6]

Mean value:	0.638204
Standard deviation:	0.003094
Standard error:	0.001259
Relative Standard error:	0.001973

8 Optical Efficiency of Inner Beam

List of Measurements

Date	e_i ± SE_e_i	Normalized
D20190122	0.987579 ± 0.000391	(1 ± 0.000396)
D20190312	0.988231 ± 0.000999	(1 ± 0.001011)
D20190423	0.986089 ± 0.000349	(1 ± 0.000354)
D20190611	0.987163 ± 0.000440	(1 ± 0.000446)
D20190625	0.986840 ± 0.000398	(1 ± 0.000403)
D20190910	0.987087 ± 0.000326	(1 ± 0.000330)
D20191210	0.987484 ± 0.000354	(1 ± 0.000359)



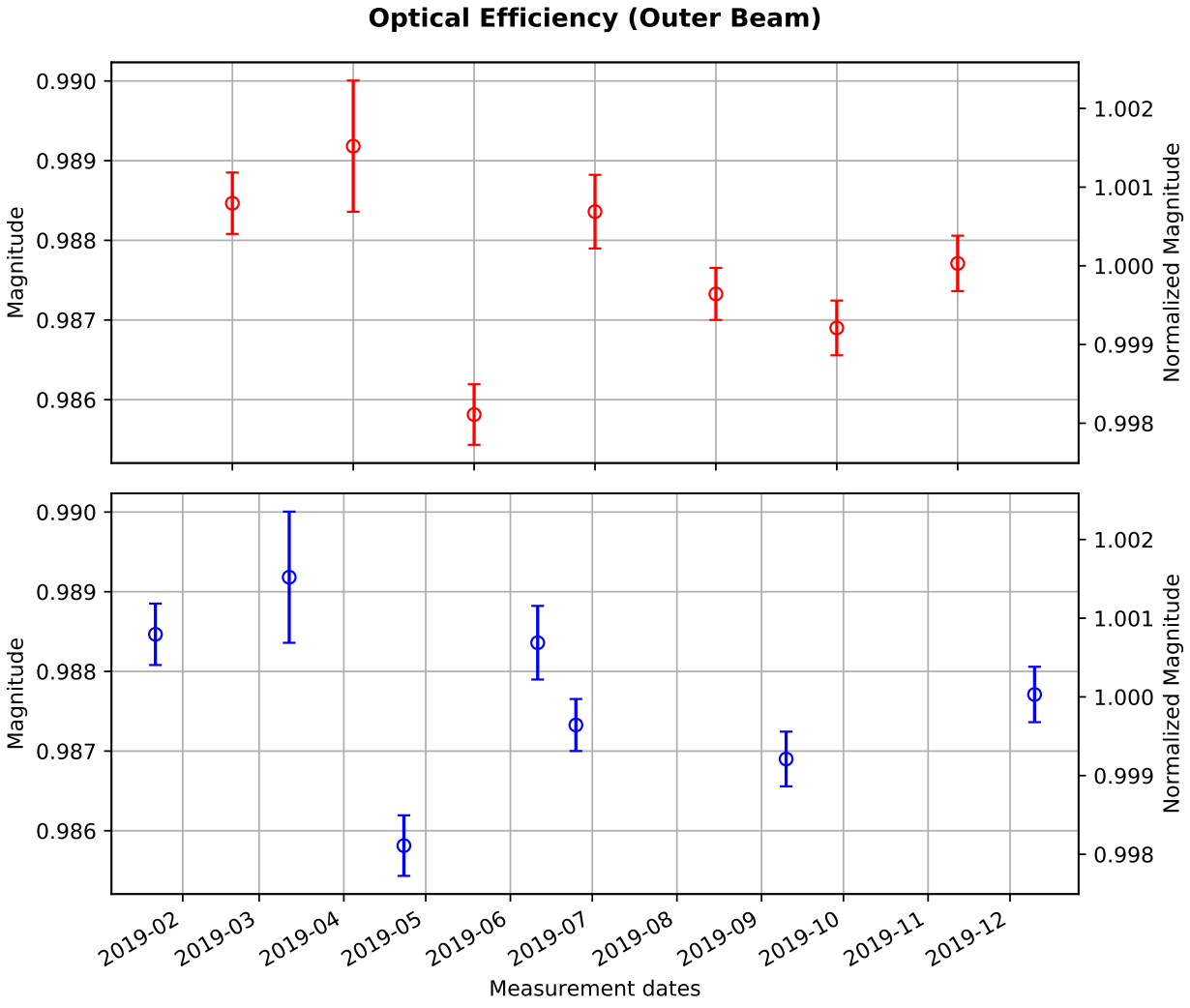
Summary of Optical Efficiency (Inner Beam)

Mean value:	0.987210
Standard deviation:	0.000666
Standard error:	0.000271
Relative Standard error:	0.000275

9 Optical Efficiency of Outer Beam

List of Measurements

Date	e_o ± SE_e_o	Normalized
D20190122	0.988466 ± 0.000386	(1 ± 0.000390)
D20190312	0.989182 ± 0.000823	(1 ± 0.000832)
D20190423	0.985814 ± 0.000380	(1 ± 0.000386)
D20190611	0.988360 ± 0.000462	(1 ± 0.000468)
D20190625	0.987327 ± 0.000326	(1 ± 0.000331)
D20190910	0.986901 ± 0.000343	(1 ± 0.000348)
D20191210	0.987711 ± 0.000348	(1 ± 0.000352)

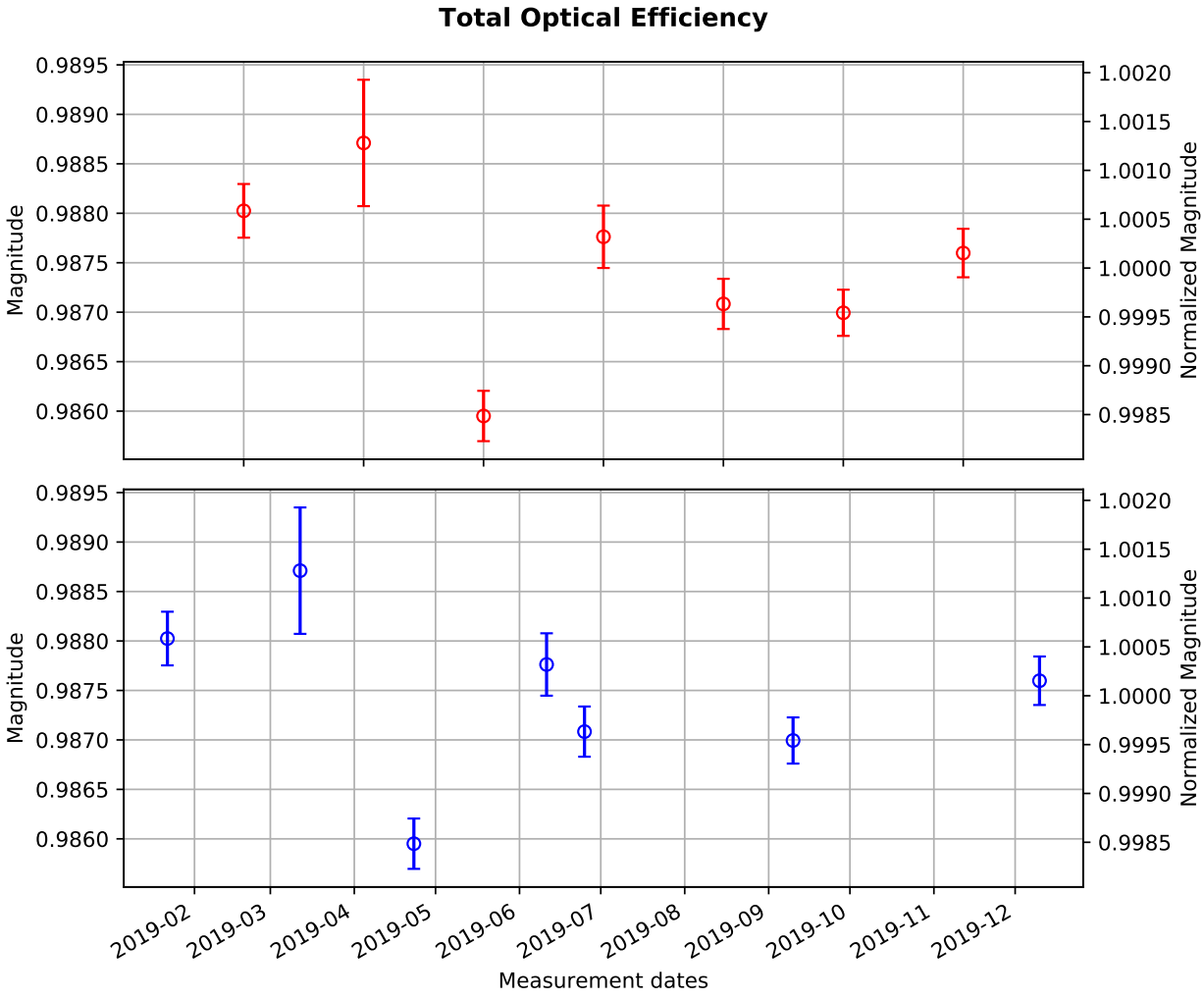


Summary of Optical Efficiency (Outer Beam)	
Mean value:	0.987680
Standard deviation:	0.001122
Standard error:	0.000457
Relative Standard error:	0.000462

10 Total Optical Efficiency

List of Measurements

Date	e ± 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)



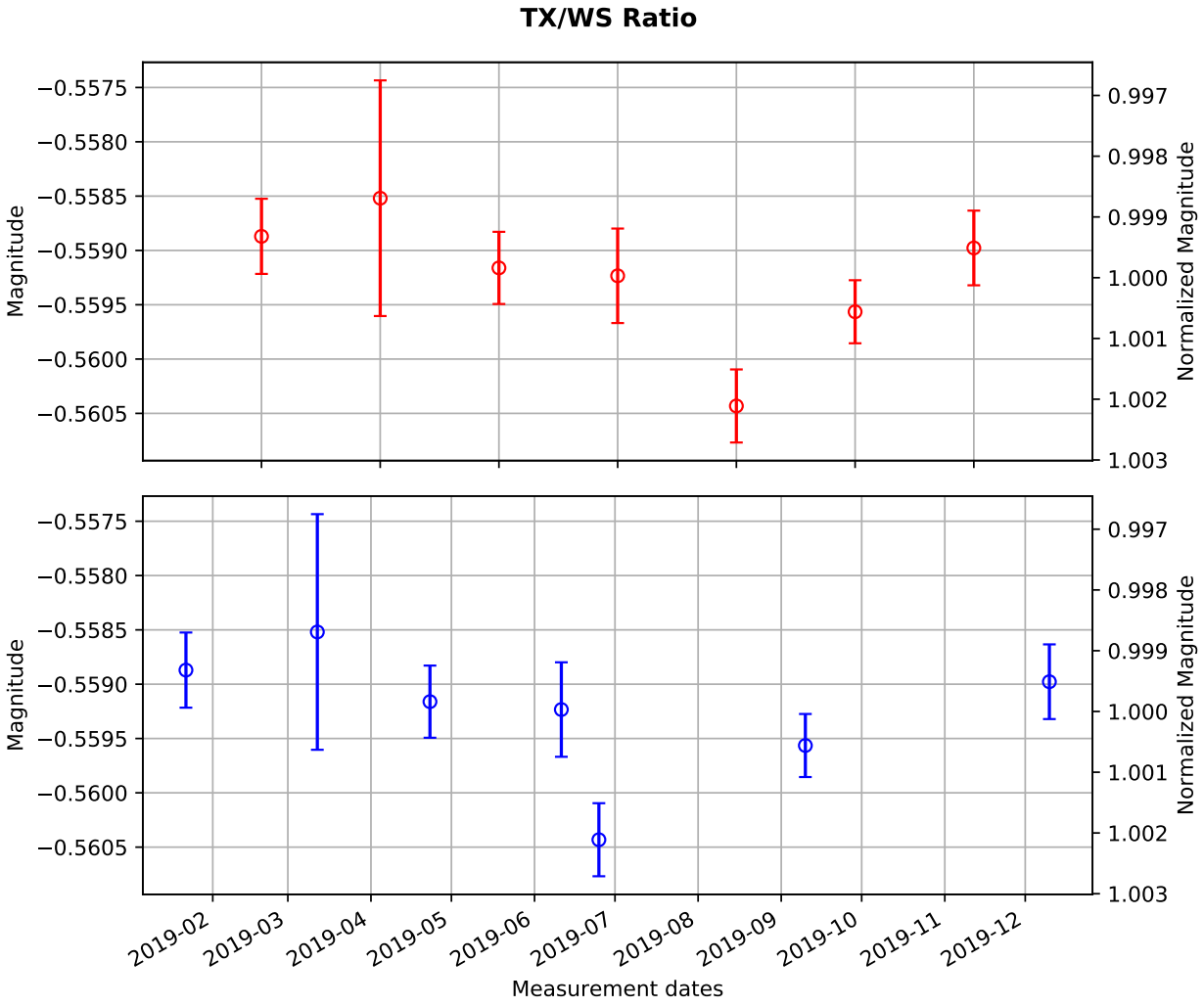
Summary of Total Optical Efficiency

Mean value:	0.987446
Standard deviation:	0.000878
Standard error:	0.000357
Relative Standard error:	0.000362

11 TX/WS Ratio

List of Measurements

Date	TW ± SE_TW	Normalized
D20190122	-0.558870 ± 0.000346	(1 ± 0.000619)
D20190312	-0.558519 ± 0.001085	(1 ± 0.001942)
D20190423	-0.559161 ± 0.000332	(1 ± 0.000594)
D20190611	-0.559233 ± 0.000435	(1 ± 0.000778)
D20190625	-0.560432 ± 0.000336	(1 ± 0.000600)
D20190910	-0.559565 ± 0.000290	(1 ± 0.000519)
D20191210	-0.558977 ± 0.000344	(1 ± 0.000615)



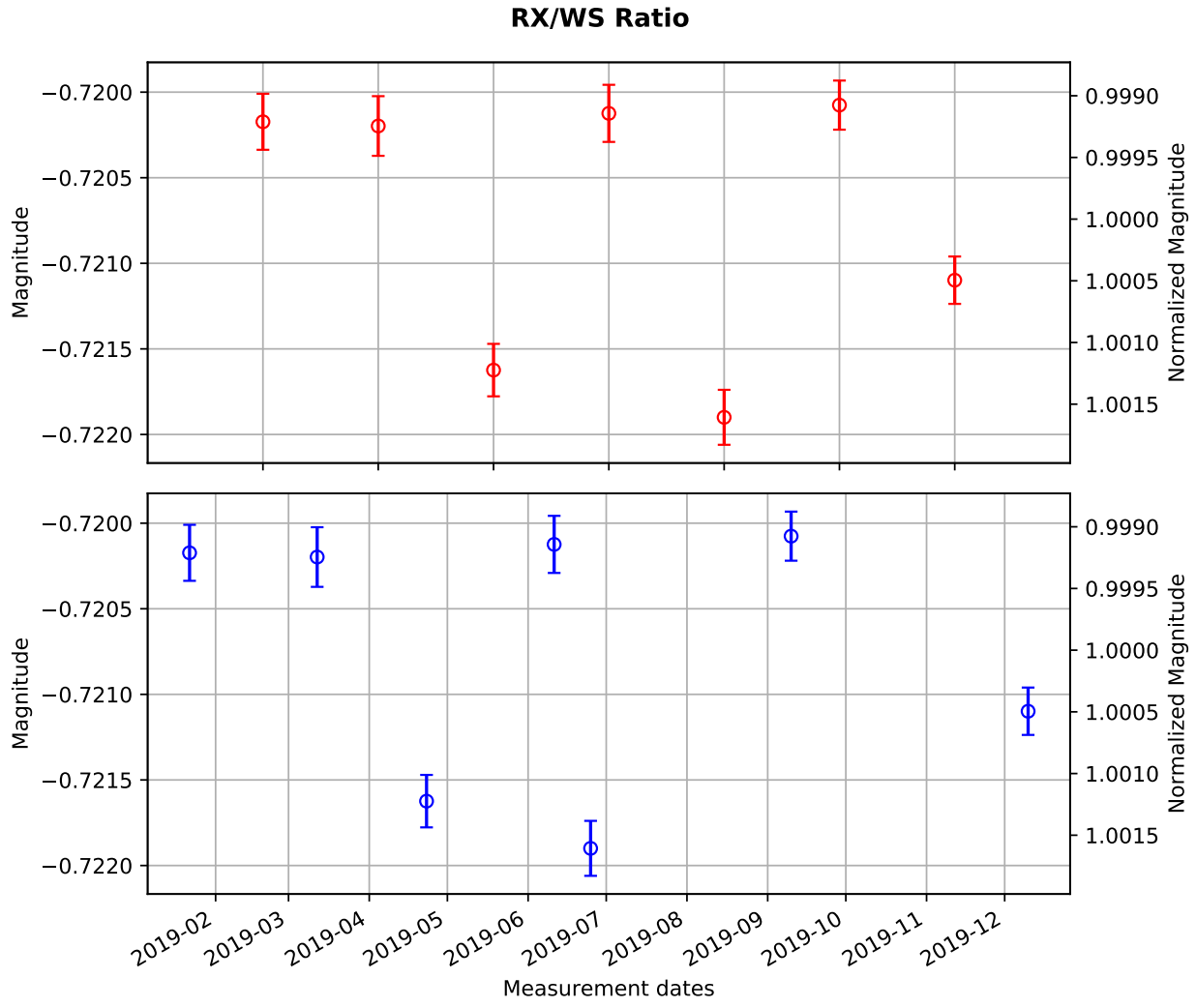
Summary of TX/WS Ratio

Mean value:	-0.559251
Standard deviation:	0.000613
Standard error:	0.000250
Relative Standard error:	0.000446

12 RX/WS Ratio

List of Measurements

Date	RW ± SE_RW	Normalized
D20190122	-0.720173 ± 0.000164	(1 ± 0.000227)
D20190312	-0.720198 ± 0.000174	(1 ± 0.000242)
D20190423	-0.721624 ± 0.000153	(1 ± 0.000212)
D20190611	-0.720124 ± 0.000167	(1 ± 0.000232)
D20190625	-0.721900 ± 0.000161	(1 ± 0.000222)
D20190910	-0.720076 ± 0.000143	(1 ± 0.000199)
D20191210	-0.721099 ± 0.000138	(1 ± 0.000192)



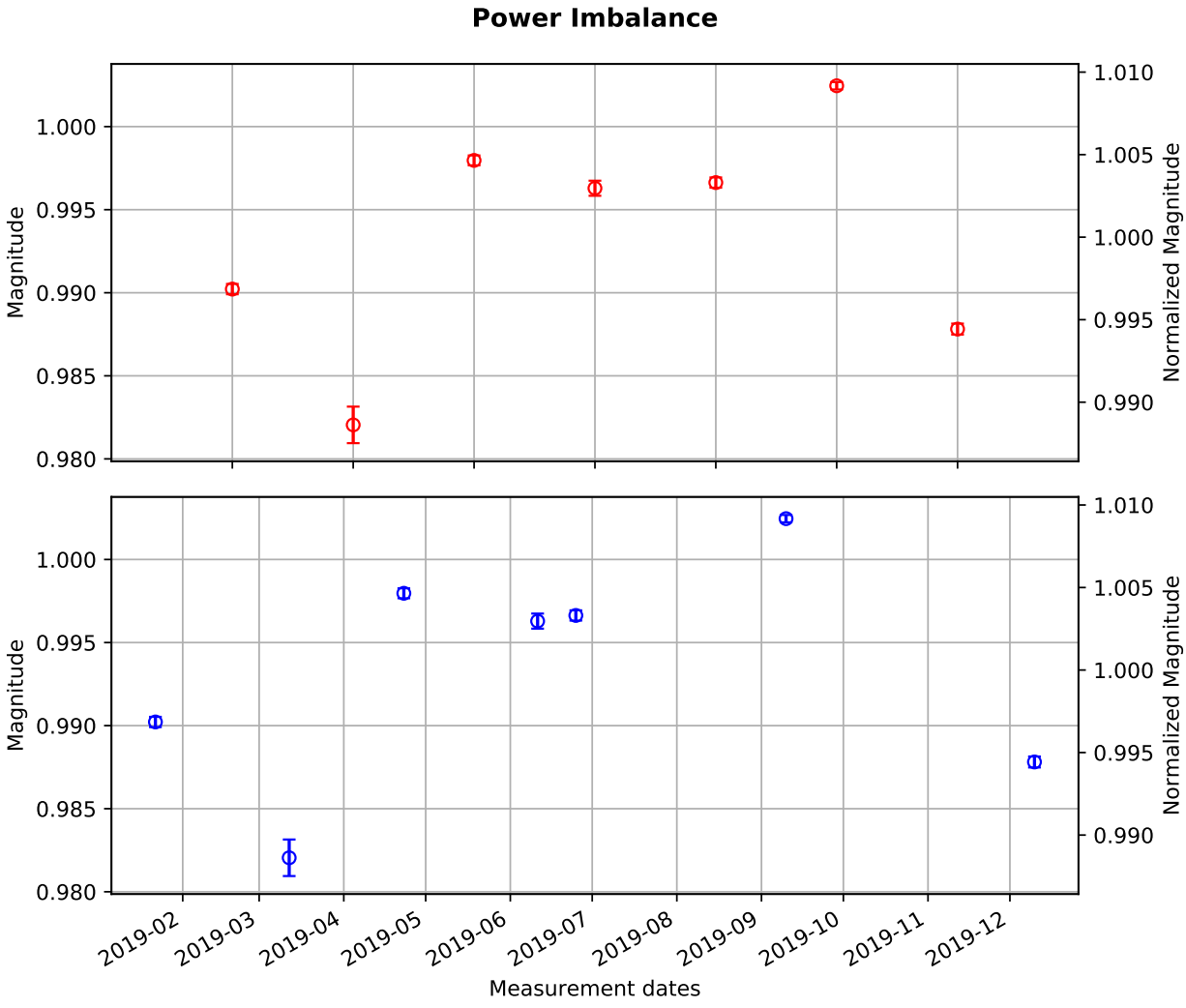
Summary of RX/WS Ratio

Mean value:	-0.720742
Standard deviation:	0.000784
Standard error:	0.000319
Relative Standard error:	0.000443

13 Power Imbalance

List of Measurements

Date	PI ± SE_PI	Normalized
D20190122	0.990220 ± 0.000309	(1 ± 0.000312)
D20190312	0.982046 ± 0.001100	(1 ± 0.001120)
D20190423	0.997965 ± 0.000299	(1 ± 0.000299)
D20190611	0.996290 ± 0.000454	(1 ± 0.000456)
D20190625	0.996631 ± 0.000309	(1 ± 0.000310)
D20190910	1.002457 ± 0.000223	(1 ± 0.000222)
D20191210	0.987813 ± 0.000331	(1 ± 0.000335)



Summary of Power Imbalance

Mean value:	0.993346
Standard deviation:	0.006975
Standard error:	0.002838
Relative Standard error:	0.002857