ARGOS QC-APD performance

Gilles Orban de Xivry

January 29, 2016
v 0.0

The jitter is measured as follows (see also notes from July 2015). Based on the LGS slopes and reconstructor matrix, it is computed as:

$$m_{\mathrm{LGS,tt}} = \mathbf{R}_{\mathrm{LGS}}\ \mathbf{s}$$

The value plotted is

$$\sqrt{m^2_{\mathrm{LGS,tip}} + m^2_{\mathrm{LGS,tilt}}} \times (1/(4.848e-6 \times 8.2)) \times 1e3 \times 2 \times 4.$$

$\times(1/(4.848e-6 \times 8.2)) \times 1e3 \times 2 \times 4$ to convert from RMS surface in nm to jitter (PtV wf) in mas;
From the notes of July 2015, this measurement is probably the best estimator of the tip-tilt performance in daytime.

In Fig. 1, we plot the daytime measurements obtained in July 2015 and December 2015 (the data are also given in Tab. 1), which were obtained with a disturbance simulation a seeing of $\sim$0.8″.

In Fig. 2, we reproduce a simulation plot from FDR 018 for a seeing of $\sim$1″. Considering the different seeings, the results largely agree.

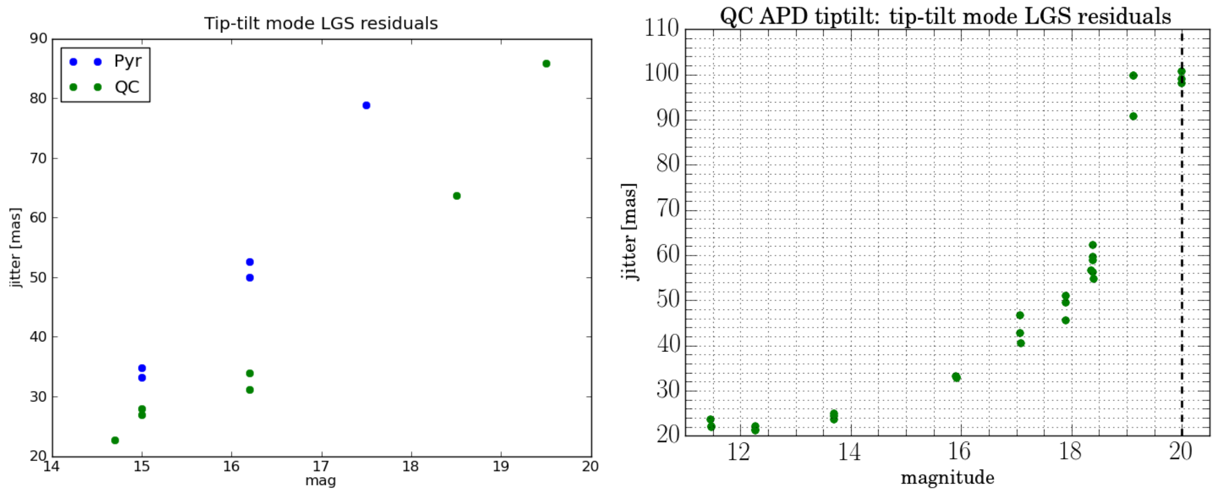

Figure 1: (Left) Jitter daytime comparison between Pyramid and QC based on the modal residual measured by the LGS-SH (with lgsw jitter gain<<). From DX data in July 2015. (Right) QC-APD jitter daytime measurements taken in December 2015 on SX. The dashed line indicates open-loop measurements. The disturbance loaded on the ASM simulate 0.8″seeing : $r_0 = 0.126m$, windspeed=$15m/s$, $L_0 = 40m$, thus simulating a seeing of $\sim 1''$.

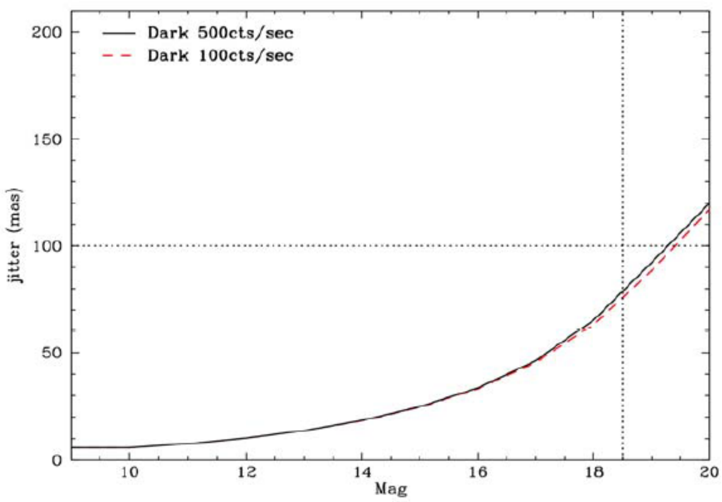

Figure 2: From FDR018. Simulation of the tip-tilt performance with APD. The atmospheric parameters were $r_0 = 0.1m$, windspeed=15m/s, $L_0 = 40m$, thus simulating a seeing of $\sim 1''$.

Table 1: SX measurements of the QC-APD tip-tilt performance. Magnitude is computed assuming a zpt=26.6.

Tag name	total counts/sec	magnitude	jitter [mas]	APD freq [Hz]	gain tip-tilt
20151215_100315	1128353.	11.46	22.02	949.26	1.5
20151215_100347	1128904.	11.46	22.06	949.50	1.5
20151215_100422	1130306.	11.46	23.59	950.48	1.5
20151215_101617	536331.1	12.27	21.21	948.53	1.5
20151215_101637	536853.4	12.27	21.37	948.28	1.5
20151215_101655	537004.7	12.27	22.13	948.53	1.5
20151215_102623	145072.7	13.69	23.71	766.05	1.75
20151215_102640	144744.2	13.69	24.32	764.45	1.75
20151215_102702	144229.7	13.70	25.01	764.70	1.75
20151215_103641	18806.00	15.91	32.77	394.85	2.2
20151215_103708	18924.14	15.90	33.28	398.15	2.2
20151215_103725	18790.51	15.91	33.04	396.30	2.2
20151215_104625	6528.021	17.06	46.66	266.15	2.25
20151215_104640	6448.942	17.07	40.49	264.14	2.25
20151215_104653	6483.581	17.07	42.77	263.48	2.25
20151215_110301	3019.956	17.89	50.95	185.52	0.75
20151215_110319	3038.898	17.89	45.59	188.44	0.75
20151215_110338	3029.427	17.89	49.61	186.50	0.75
20151215_110910	1918.440	18.39	58.83	96.383	1.0
20151215_110930	1904.116	18.40	54.73	95.412	1.0
20151215_110948	1928.877	18.38	56.33	97.378	1.0
20151215_111241	2044.711	–	99.07	97.864	0.0
20151215_111257	2079.819	–	98.01	97.791	0.0
20151215_111314	2042.283	–	100.7	98.592	0.0
20151215_111429	1920.377	18.39	62.23	97.135	1.0
20151215_111451	1925.267	18.38	59.59	97.184	1.0
20151215_111508	1980.106	18.35	56.66	99.782	1.0
20151215_112156	986.9012	19.11	99.69	92.764	1.75
20151215_112213	985.6796	19.11	90.80	91.747	1.75
20151215_112230	986.1688	19.11	99.82	92.498	1.75