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2015 JINST 10 E07001

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Erratum: Micromegas-TPC operation at high pressure in xenon-trimethylamine mixtures

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ERRATUM TO: [2013 JINST 8 P01012](#)

During the investigations performed after the publication of the original article, a mistake in the calibration procedure was revealed, resulting in a $\sim 50\%$ relative increase of the estimate of the concentration of trimethylamine (TMA) in the mixtures employed. In this erratum we provide the correct concentrations after a careful re-evaluation, and therefore the statistical and systematic uncertainties are now included. The calibration procedure was performed by pre-mixing TMA with Xenon for known concentrations of the former in the range 0.5% to 50%. Several external conditions were altered, like the time before sampling and the time required for proper mixing (done with a recirculation pump), yielding deviations of about 10%. The overall statistical uncertainty was obtained from the one derived for the calibration factor, once combined with the statistical uncertainty in the estimate of the most prominent peaks of the involved species: TMA($A = 59$) and Xe($A = 132$), illustrated in figure 1. Generally, where it had been previously stated that the optimum for operation of Micromegas (i.e., maximum Penning transfer before excessive electron cooling) corresponded to about $\sim 1.5\%$ TMA admixture, it should be modified to $\sim 1\%$ TMA after this revision. A compilation of the new concentrations can be found in tables 1–6.

Additionally, the Micromegas pitch of $115\mu\text{m}$ quoted in the original article was found to be $100\mu\text{m}$ after microscope inspection.

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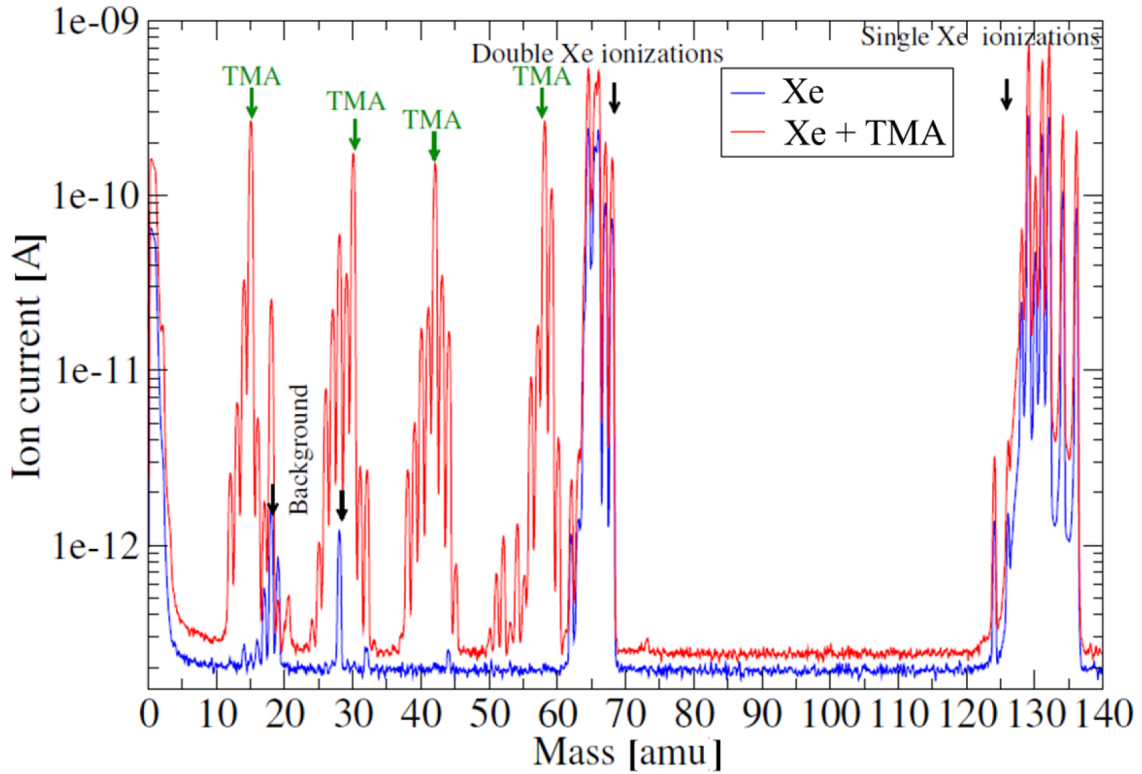


Figure 1. Spectrograms obtained from the mass spectrometer for the case of pure Xenon and for Xenon mixed with TMA. If the peaks $A = 59(\text{TMA})$ and $A = 132(\text{Xe})$ are selected, there is neither interference between these two species nor with impurities.

Table 1. Admixtures used for the transmission scan provided in figure 2 of the original article. Detailed concentrations were not explicitly given but generally stated as $\sim 1.5\%$ TMA.

series	P[bar]	%TMA(published)	%TMA(corrected)
transmission	1	1.50	0.99 $\pm 0.02(\text{sta}) \pm 0.10(\text{sys})$
	2	1.67	1.01 $\pm 0.03(\text{sta}) \pm 0.10(\text{sys})$
	3	1.85	1.15 $\pm 0.03(\text{sta}) \pm 0.11(\text{sys})$
	4	1.45	0.86 $\pm 0.02(\text{sta}) \pm 0.09(\text{sys})$
	5	1.45	0.86 $\pm 0.02(\text{sta}) \pm 0.09(\text{sys})$
	6	1.45	0.86 $\pm 0.02(\text{sta}) \pm 0.08(\text{sys})$
	7	1.32	0.79 $\pm 0.02(\text{sta}) \pm 0.08(\text{sys})$
	8	1.32	0.79 $\pm 0.02(\text{sta}) \pm 0.08(\text{sys})$
	9	1.32	0.79 $\pm 0.02(\text{sta}) \pm 0.08(\text{sys})$
	10	1.32	0.79 $\pm 0.02(\text{sta}) \pm 0.07(\text{sys})$

Table 2. Admixtures used for the gain scan provided in figure 5a of the original article. Table 1 and figure 7 should be modified accordingly.

series	P[bar]	%TMA(published)	%TMA(corrected)
gain	1	0.4	0.25 \pm 0.01(sta) \pm 0.03(sys)
	1	1.4	0.91 \pm 0.03(sta) \pm 0.09(sys)
	1	1.7	1.22 \pm 0.22(sta) \pm 0.12(sys)
	1	2.4	1.51 \pm 0.05(sta) \pm 0.15(sys)
	1	3.4	2.30 \pm 0.06(sta) \pm 0.23(sys)
	1	6.4	4.52 \pm 0.11(sta) \pm 0.45(sys)
	1	12.4	9.28 \pm 0.23(sta) \pm 0.92(sys)
	1	15.5	10.41 \pm 0.24(sta) \pm 1.04(sys)

Table 3. Admixtures used for the gain scan provided in figure 5b of the original article. Table 1 and figure 7 should be modified accordingly.

series	P[bar]	%TMA(published)	%TMA(corrected)
gain	5	0.4	0.25 \pm 0.01(sta) \pm 0.02(sys)
	5	0.8	0.45 \pm 0.01(sta) \pm 0.05(sys)
	5	1.0	0.66 \pm 0.02(sta) \pm 0.07(sys)
	5	1.5	0.86 \pm 0.02(sta) \pm 0.09(sys)
	5	2.0	1.24 \pm 0.03(sta) \pm 0.12(sys)
	5	2.6	1.61 \pm 0.04(sta) \pm 0.16(sys)
	5	3.3	2.05 \pm 0.05(sta) \pm 0.20(sys)
	5	4.0	2.50 \pm 0.06(sta) \pm 0.24(sys)
	5	5.0	2.86 \pm 0.07(sta) \pm 0.28(sys)
	5	6.0	3.83 \pm 0.09(sta) \pm 0.37(sys)

Table 4. Admixtures used for the gain scan provided in figure 5c of the original article. Table 1 and figure 7 should be modified accordingly.

series	P[bar]	%TMA(published)	%TMA(corrected)
gain	8	0.3	0.20 \pm 0.02(sta) \pm 0.02(sys)
	8	1.2	0.76 \pm 0.02(sta) \pm 0.08(sys)
	8	1.9	1.17 \pm 0.03(sta) \pm 0.12(sys)
	8	2.3	1.43 \pm 0.04(sta) \pm 0.14(sys)
	8	3.3	2.04 \pm 0.06(sta) \pm 0.20(sys)
	8	3.7	2.34 \pm 0.06(sta) \pm 0.23(sys)
	8	4.4	2.71 \pm 0.07(sta) \pm 0.27(sys)
	8	5.0	3.27 \pm 0.08(sta) \pm 0.33(sys)

Table 5. Admixtures used for the gain scan provided in figure 5d of the original article. Table 1 and figure 7 should be modified accordingly.

series	P[bar]	%TMA(published)	%TMA(corrected)
gain	10	0.8	0.35 ± 0.01 (sta) ± 0.04 (sys)
	10	1.1	0.68 ± 0.04 (sta) ± 0.07 (sys)
	10	1.6	1.02 ± 0.04 (sta) ± 0.10 (sys)
	10	1.8	1.08 ± 0.03 (sta) ± 0.11 (sys)
	10	1.9	1.17 ± 0.19 (sta) ± 0.12 (sys)
	10	2.7	1.71 ± 0.04 (sta) ± 0.17 (sys)
	10	6.2	3.79 ± 0.09 (sta) ± 0.38 (sys)

Table 6. Admixtures used for the gain scan provided in figure 8 of the original article. Table 2 should be modified accordingly.

series	P[bar]	%TMA(published)	%TMA(corrected)
gain	1	1.7	1.22 ± 0.22 (sta) ± 0.12 (sys)
	2	1.7	1.01 ± 0.03 (sta) ± 0.10 (sys)
	3	1.5	0.92 ± 0.02 (sta) ± 0.09 (sys)
	4	1.6	0.99 ± 0.02 (sta) ± 0.10 (sys)
	5	2.0	1.24 ± 0.03 (sta) ± 0.12 (sys)
	6	2.0	1.24 ± 0.03 (sta) ± 0.12 (sys)
	7	2.0	1.26 ± 0.03 (sta) ± 0.12 (sys)
	8	1.9	1.17 ± 0.03 (sta) ± 0.12 (sys)
	9	1.9	1.17 ± 0.03 (sta) ± 0.12 (sys)
	10	1.8	1.08 ± 0.04 (sta) ± 0.17 (sys)