Erratum: Evidence for CP Violation in the Decay $D^+ \to K_S^0\pi^+$ [Phys. Rev. Lett. 109, 021601 (2012)]

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We provide herein three corrigenda to the original Letter.

The first item is the proper calculation of the correction factor and its uncertainty due to acceptance effects of K_S^0 decay (the so-called Grossman and Nir effect described in Ref. [1]). This correction factor appears in the middle of the antepenultimate paragraph (starting with "According to Grossman and Nir"). The original value was miscalculated as 1.040 ± 0.005; the proper value is 1.022 ± 0.007.

The second item is an overestimation of the propagated error when folding the Grossman-Nir factor into the raw asymmetry of $(-0.332 \pm 0.006)\%$ due to neutral kaons to obtain a measured asymmetry of $(-0.345 \pm 0.008)\%$. This appears at the end of the same antepenultimate paragraph. The original propagated error of 0.008%, using the original Grossman-Nir factor of 1.040 ± 0.005, should have been 0.006%. With the proper Grossman-Nir factor and the proper calculation of the propagated error, the proper value and uncertainty of the measured asymmetry due to neutral kaons is $(-0.339 \pm 0.007)\%$.

The third item is the proper calculation of the intrinsic asymmetry $A_{CP}^{\Delta C}$ in charm decay after subtraction of the measured asymmetry due to neutral kaons mentioned above. This appears in the penultimate paragraph. The original value was $(-0.018 \pm 0.094 \pm 0.068)\%$. The proper value is $(-0.024 \pm 0.094 \pm 0.067)\%$.

Finally, we emphasize that these corrections do not change the conclusion of the original Letter.

The corrected antepenultimate and penultimate paragraphs follow.

"According to Grossman and Nir [19], we can estimate the experimentally measured CP asymmetry induced by SM $K^0 - \bar{K}^0$ mixing, $A_{CP}^{\bar{K}^0}$, assuming negligible DCS decay $D^+ \to K^0\pi^+$ in the final state $D^+ \to K_S^0\pi^+$. By multiplying $A_{CP}^{\bar{K}^0}$ by the correction factor 1.022 ± 0.007 due to the acceptance effects as a function of K_S^0 decay time in our detector, we find the measured asymmetry due to the neutral kaons to be $(-0.339 \pm 0.007)\%$.

In summary, we report evidence for CP violation in the decay $D^+ \to K_S^0\pi^+$ using a data sample corresponding to an integrated luminosity of 977 fb^{-1} collected with the Belle detector. The CP asymmetry in the decay is measured to be

$(-0.363 \pm 0.094 \pm 0.067)\%$, which represents the first evidence for CP violation in charmed meson decays from a single experiment and a single decay mode. After subtracting the contribution due to $K^0 - \bar{K}^0$ mixing ($A_{CP}^{\bar{K}^0}$), the CP asymmetry due to the change of charm ($A_{CP}^{\Delta C} = A_{CP}^{D^+ \to \bar{K}^0 \pi^+}$) is consistent with zero: $A_{CP}^{\Delta C} = (-0.024 \pm 0.094 \pm 0.067)\%$."

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[1] Y. Grossman and Y. Nir, J. High Energy Phys. 04 (2012) 002.