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Combinations of single-top-quark production cross-section measurements and $|f_{LV} V_{tb}|$ determinations at $\sqrt{s} = 7$ and 8 TeV with the ATLAS and CMS experiments (Article) [Open Access](#)

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Abstract

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This paper presents the combinations of single-top-quark production cross-section measurements by the ATLAS and CMS Collaborations, using data from LHC proton-proton collisions at $s = 7$ and 8 TeV corresponding to integrated luminosities of 1.17 to 5.1 fb⁻¹ at $s = 7$ TeV and 12.2 to 20.3 fb⁻¹ at $s = 8$ TeV. These combinations are performed per centre-of-mass energy and for each production mode: t-channel, tW, and s-channel. The combined t-channel cross-sections are 67.5 ± 5.7 pb and 87.7 ± 5.8 pb at $s = 7$ and 8 TeV respectively. The combined tW cross-sections are 16.3 ± 4.1 pb and 23.1 ± 3.6 pb at $s = 7$ and 8 TeV respectively. For the s-channel cross-section, the combination yields 4.9 ± 1.4 pb at $s = 8$ TeV. The square of the magnitude of the CKM matrix element V_{tb} multiplied by a form factor f_{LV} is determined for each production mode and centre-of-mass energy, using the ratio of the measured cross-section to its theoretical prediction. It is assumed that the top-quark-related CKM matrix elements obey the relation $|V_{td}|, |V_{ts}| \ll |V_{tb}|$. All the $|f_{LV} V_{tb}|^2$ determinations, extracted from individual ratios at $s = 7$ and 8 TeV, are combined, resulting in $|f_{LV} V_{tb}| = 1.02 \pm 0.04$ (meas.) \pm 0.02 (theo.). All combined measurements are consistent with their corresponding Standard Model predictions.[Figure not available: see fulltext.]. © 2019, The Author(s).

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