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Sommario/riassunto	This thesis describes two groundbreaking measurements in the precision frontier at the LHC: the first ever differential measurement of the Z-associated single top quark (tZq) production, and the luminosity measurement using Z boson production rate for the first time in CMS. Observed only in 2018, the tZq process is of great importance in probing top quark electroweak couplings. These couplings are natural places for new phenomena to happen in the top quark sector of the standard model. Yet, they are the least explored directly. One has to obtain a firm understanding of the modeling of sensitive distributions to new top-Z interactions. The present analysis marks a major

milestone in this long-term effort. All distributions relevant for new phenomena, and/or modeling of tZq, are studied in full depth using advanced Machine Learning techniques.The luminosity and its uncertainty contributes to every physics result of the experiment. The method minutely developed in this thesis provides a complementary measurement that results in a significant overall reduction of uncertainties.