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Nota di contenuto	Introduction -- The Standard Model and beyond -- Precision tests of the SM -- Structure functions -- Adelaide-Jefferson Lab-Manitoba model -- The Z box corrections -- Electric and magnetic polarizabilities of the proton -- Quark-hadron duality -- Summary and conclusion.
Sommario/riassunto	This thesis examines the Z box contribution to the weak charge of the proton. Here, by combining recent parity-violating electron-deuteron scattering data with our current understanding of parton distribution functions, the author shows that one can limit this model dependence. The resulting construction is a robust model of the and Z structure functions that can also be used to study a variety of low-energy phenomena. Two such cases are discussed in this work, namely, the nucleon’s electromagnetic polarizabilities and quark-hadron duality. By using phenomenological information to constrain the input structure functions, this important but previously poorly understood radiative correction is determined at the kinematics of the parity-violating experiment, QWEAK, to a degree of precision more than twice that of the previous best estimate. A detailed investigation

into available parametrizations of the electromagnetic and interference cross-sections indicates that earlier analyses suffered from the inability to correctly quantify their model dependence.