



PHYSIKALISCHES KOLLOQUIUM

Vortrag: **Prof. Dr. Ashutosh Kotwal**

Duke University, USA

and

Prof. Dr. Sven Heinemeyer

IFT (CSIC, Madrid), Spain

Thema: **High-precision measurement of the W boson mass with the CDF II detector** – A. Kotwal

The CDF Measurement of the W-boson mass: Theory Implications – S. Heinemeyer

Zeit und Ort: Dienstag, 3.5.2022, 16:40 Uhr – Online colloquium

Zoom-Meeting: Meeting-ID: 868 6739 8569 / Kenncode: PK-22!-K+H

<https://tu-dresden.zoom.us/j/86867398569?pwd=c2VsSGhGc21oaitWcVdiT2dDQ2dnQT09>

Leitung: Prof. Dr. Dominik Stöckinger

Kurzfassung: A. Kotwal:

The mass of the W boson, a mediator of the weak force between elementary particles, is tightly constrained by the symmetries of the standard model of particle physics. The Higgs boson was the last missing component of the model. After observation of the Higgs boson, a measurement of the W boson mass provides a stringent test of the model. We measure the W boson mass, M_W , using data corresponding to 8.8 inverse femtobarns of integrated luminosity collected in proton-antiproton collisions at a 1.96 TeV center-of-mass energy with the CDF II detector at the Fermilab Tevatron collider. A sample of approximately 4 million W boson candidates is used to obtain $M_W = 80,433.5 \pm 6.4 \text{ stat} \pm 6.9 \text{ syst} = 80,433.5 \pm 9.4 \text{ MeV}/c^2$, the precision of which exceeds that of all previous measurements combined. This measurement is in significant tension with the standard model expectation.



S. Heinemeyer:

We discuss the theory implications of the recent measurement of the W-boson mass. We focus on the Standard Model (SM), the Two Higgs Doublet Model (2HDM) and the Minimal Supersymmetric Standard Model (MSSM). While the SM cannot accommodate the new measurement, this can be achieved in the discussed extensions.



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Biographie:

Prof. A. Kotwal is the Fritz London Distinguished Professor of Physics at Duke University. He is a Fellow of the American Physical Society and the American Association for the Advancement of Science. He is the recipient of the Alfred P. Sloan Foundation Fellowship, the Outstanding Junior Investigator Award from the US Department of Energy, and the Dean's Leadership Award from Duke University. He has served as the Associate Chair of the Physics Department. The mass of the W boson, a mediator of the weak force between elementary

Prof. S. Heinemeyer: 1998: PhD in Karlsruhe (Advisor: W. Hollik) / Postdocs: DESY (Hamburg), BNL (USA), LMU, CERN / Current position: Profesor de Investigacion (with CSIC, the spanish research council - like Max Planck in Germany) / Work on the W-boson mass started already in the PhD, and continued since.