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A radial Time Projection Chamber for the ALPHA-g antimatter gravity measurement at CERN LARS MARTIN, PIERRE-ANDR AMAUDRUZ, DARYL BISHOP, ANDREA CAPRA, MAKOTO FUJIWARA, ROBERT HENDERSON, LEONID KURCHANINOV, TRIUMF, SCOTT MENARY, Dept., of Physics and Astronomy, York University, KONSTANTIN OLCHANSKI, TRIUMF — Antimatter is believed to be affected by gravity in exactly the same way as ordinary matter for a variety of good reasons, however this has never been measured directly. The ALPHA-g project is a new antihydrogen trap based on the previous ALPHA design (Antihydrogen Laser Physics Apparatus, the first experiment to trap antihydrogen in 2010). As in previous ALPHA experiments the trapped antihydrogen is detected via its charged annihilation products after switching off the trap. In order to be sensitive to small gravitational effects the setup extends more than 2 m in the vertical direction, requiring the particle detection system to cover a large volume with good tracking accuracy. The design chosen to replace the previous experiments' Silicon detectors is a radial field time-projection-chamber (rTPC) filled with an Argon/CO_2 mixture. Results of extensive Garfield simulations and prototype tests are presented and evaluated in terms of vertex resolution and its consequences for the gravity measurement. Additionally we give a progress report on the construction of the final detector, which is scheduled to be on-line in late 2017 for a first stage *up/down* measurement.

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