The puzzles of the decay of ^{185}Bi, the heaviest proton-emitting nucleus

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In two experiments at Argonne National Laboratory's ATLAS facility, utilising both the Fragment Mass Analyzer (FMA) and Argonne Gas-Filled Analyzer (AGFA) we have revisited two long-standing puzzles in the decay of ^{185}Bi, which is the heaviest known proton-emitting nucleus. Combining the results from the two complementary experiments has established the existence of an isomeric state in ^{185}Bi and shown that the half-life of the proton- and alpha-decaying ground state is extremely short. These results, which will be discussed in this talk, lead to a proton-decay spectroscopic factor which is close to unity and represents the only known example of a ground-state proton decay to a daughter nucleus (^{184}Pb) with a major shell closure. The implications for nuclear structure in this important region of the chart will be discussed as will implications for future work studying other potential proton-emitting nuclei, including above the Z=82 shell closure, which continue to yield surprising and fascinating results.