Accelerating universe, WEP violation and antihydrogen atoms

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We start with showing how the discovery of the accelerating universe can be understood by a nonzero cosmological constant, which allows an interpretation in terms of a scalar field, a yet to be discovered partner of the spacetime metric field in the language of Einstein's general relativity. We also show how the scalar-tensor theory of gravitation, a well-studied theoretical alternative to general relativity, provides a solution to today's version of the cosmological constant problem. We emphasize that the theoretical analysis suggests the Weak Equivalence Principle (WEP) to be violated rather naturally. Further from the point of view of unifying particle physics and gravitation, a vector field may also be included in the list of Non-Geometric Gravitational Fields (NGGF). We then show two types of the detailed calculation on antihydrogen atoms to test WEP.