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Deffayet: "Partially Massless Graviton on Beyond Einstein Spacetimes"

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We show that a partially massless graviton can propagate on a large set of spacetimes which are not Einstein spacetimes. Starting from a recently constructed theory for a massive graviton that propagates the correct number of degrees of freedom on an arbitrary spacetime, we first give the full explicit form of the scalar constraint responsible for the absence of a sixth degree of freedom. We then spell out generic conditions for the constraint to be identically satisfied, so that there is a scalar gauge symmetry which makes the graviton partially massless. These simplify if one assumes that spacetime is Ricci symmetric. Under this assumption, we find explicit non-Einstein spacetimes (some, but not all, with vanishing Bach tensors) allowing for the propagation of a partially massless graviton. These include in particular the Einstein static Universe.