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On the screening mechanism in DHOST theories evading gravitational wave constraints

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We consider a subclass of degenerate higher-order scalar-tensor (DHOST) theories in which gravitational waves propagate at the speed of light and do not decay into scalar fluctuations. The screening mechanism in DHOST theories evading these two gravitational wave constraints operates very differently from that in generic DHOST theories. We derive a spherically symmetric solution in the presence of nonrelativistic matter. General relativity is recovered in the vacuum exterior region provided that functions in the Lagrangian satisfy a certain condition, implying that fine-tuning is required. Gravity in the matter interior exhibits novel features: although the gravitational potentials still obey the standard inverse power law, the effective gravitational constant is different from its exterior value, and the two metric potentials do not coincide. We discuss possible observational constraints on this subclass of DHOST theories, and argue that the tightest bound comes from the Hulse-Taylor pulsar.

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