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What quantum foundations teach us about black holes

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Black holes provide a setting to test assumptions about the interplay of quantum theory and gravity. These tests have led to several puzzles, such as the xeroxing or firewall paradox. A common feature of these puzzles is that they combine the perspectives of an infalling observer and an exterior observer, who, for fundamental reasons, have access to different systems. In quantum foundations, so-called Wigner's friend experiments study observers with different perspectives, without involving gravity. Recent versions have shown that even mild assumptions about the combination of different observers' perspectives are inconsistent with quantum theory. A careful analysis of the firewall paradox reveals that it, too, relies on this assumption. Therefore, the firewall paradox may not stem from inconsistent assumptions about quantum gravity, but from quantum theory's limitations in consistently combining multiple observers' viewpoints.

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