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Isolated stellar mass black holes in the galaxy: method, first detection, and implications

According to theoretical estimates, our Galaxy contains about 100 million black holes, a large majority of which should be isolated. Yet, not a single isolated black hole had ever been unambiguously detected. After a brief review of the subject, the powerful technique of astrometric microlensing to detect isolated stellar mass black holes will be described. We used this novel technique of astrometric microlensing to unambiguously detect the first isolated stellar mass black hole. The superb astrometric capability of HST allowed us to measure the deflection caused by the black hole, and thereby measure its mass. Our measured mass of 7 solar mass, coupled with the fact that it emits no light confirmed its black hole nature. The implications of this detection and the status of our ongoing program to detect isolated black holes will be discussed. Future telescopes such as the Roman telescope should detect a large number of such isolated black holes.

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