Line		
	After evidence was obtained in the 1920s that the universe is expanding, it became reasonable to ask: Will the universe continue to expand indefinitely, or is there enough mass in it for the mutual attraction of its constituents to bring this expansion to a halt? It can be calculated that the critical density of matter needed to brake the expansion and "close" the universe is equivalent to three hydrogen atoms per cubic meter. But the density of the observable universe—luminous matter in the form of galaxies—comes to only a fraction of this. If the expansion of the universe is to stop, there must be enough invisible matter in the universe to exceed the luminous matter in density by a factor of roughly 70. Our contribution to the search for this "missing matter" has been to study the rotational velocity of galaxies at various distances from their center of rotation. It has been known for some time that outside the bright nucleus of a typical spiral galaxy luminosity falls off rapidly with distance from the center. If luminosity were a true indicator of mass, most of the mass would be concentrated toward the center. Outside the nucleus the rotational velocity would decrease geometrically with distance from the center, in conformity with Kepler's law. Instead we have found that the rotational velocity in spiral galaxies either remains constant with increasing distance from the center or increases slightly. This unexpected result indicates that the falloff in luminous mass with distance from the center is balanced by an increase in nonluminous mass. Our findings suggest that as much as 90 percent of the mass of the universe is not radiating at any wavelength with enough intensity to be detected on the Earth. Such dark matter could be in the form of extremely dim stars of low mass, of large planets like Jupiter, or of black holes, either small or massive. While it has not yet been determined whether this mass is sufficient to close the universe, some physicists consider it significant that estimates are converging on the critical value.	(1).The passage is primarily concerned with (A) defending a controversial approach (B) criticizing an accepted view (C) summarizing research findings (D) contrasting competing theories (E) describing an innovative technique (2).The authors' study indicates that, in comparison with the outermost regions of a typical spiral galaxy, the region just outside the nucleus can be characterized as having (A) higher rotational velocity and higher luminosity (B) lower rotational velocity and higher luminosity (C) lower rotational velocity and lower luminosity (D) similar rotational velocity and higher luminosity (E) similar rotational velocity and similar luminosity (3).The authors' suggestion that "as much as 90 percent of the mass of the universe is not radiating at any wavelength with enough intensity to be detected on the Earth" (lines 34–37) would be most weakened if which of the following were discovered to be true? (A) Spiral galaxies are less common than types of galaxies that contain little nonluminous matter. (B) Luminous and nonluminous matter are composed of the same basic elements. (C) The bright nucleus of a typical spiral galaxy also contains some nonluminous matter. (D) The density of the observable universe is greater than most previous estimates have suggested. (E) Some galaxies do not rotate or rotate too slowly for their rotational velocity to be measured.

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	After evidence was obtained in the 1920s that the universe is expanding, it became reasonable to ask: Will the universe continue to expand indefinitely, or is there enough mass in it for the	(4).It can be inferred from information presented in the passage that if the density of the universe were equivalent to significantly less than three hydrogen atoms per cubic meter, which of the following would be true as a consequence? (A) Luminosity would be a true indicator of mass. (B) Different regions in spiral galaxies would rotate at the same velocity. (C) The universe would continue to expand indefinitely. (D) The density of the invisible matter in the universe would have to be more than 70 times the density of the luminous matter. (E) More of the invisible matter in spiral galaxies would have to be located in their nuclei than in their outer regions.
(5)	mutual attraction of its constituents to bring this expansion to a halt? It can be calculated that the critical density of matter needed to brake the expansion and "close" the universe is equivalent to three hydrogen atoms per cubic meter. But the	
(10)	density of the observable universe—luminous matter in the form of galaxies—comes to only a fraction of this. If the expansion of the universe is to stop, there must be enough invisible matter in the universe to exceed the luminous matter in	
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(20)	outside the bright nucleus of a typical spiral galaxy luminosity falls off rapidly with distance from the center. If luminosity were a true indicator of mass, most of the mass would be concentrated toward the center. Outside the nucleus the rotational	(5).The authors propose all of the following as possibly contributing to the "missing matter" in spiral galaxies EXCEPT (A) massive black holes (B) small black holes (C) small, dim stars (D) massive stars (E) large planets
(25)	velocity would decrease geometrically with distance from the center, in conformity with Kepler's law. Instead we have found that the rotational velocity in spiral galaxies either remains constant with increasing distance from the center	
(30)	or increases slightly. This unexpected result indicates that the falloff in luminous mass with distance from the center is balanced by an increase in nonluminous mass. Our findings suggest that as much as 90 percent	
(35)	of the mass of the universe is not radiating at any wavelength with enough intensity to be detected on the Earth. Such dark matter could be in the form of extremely dim stars of low mass, of large planets like Jupiter, or of black holes, either small	
(40)	or massive. While it has not yet been determined whether this mass is sufficient to close the universe, some physicists consider it significant that estimates are converging on the critical value.	