Dark matter on the smallest scales

Siegel E.R., D'Amico G., Di Napoli E., Fu L., Hertzberg M.P., Huong N.T.T., Palorini F., Sellerholm A.

Department of Physics, University of Wisconsin, 1150 University Avenue, Madison, WI 53706, United States; Department of Physics, Scuola Normale Superiore, Pisa, 56100, Italy; Department of Physics and Astronomy, University of North Carolina, CB#3255 Phillips Hall, Chapel Hill, NC 27599, United States; Joint Center of Astrophysics, Shanghai Normal University, 200234 Shanghai, China; Center for Theoretical Physics, MIT, Cambridge, MA 02139, United States; Centre for High Energy Physics, Vietnam National University - Hanoi, 334 Nguyen Trai Street, Hanoi, Viet Nam; Universit?? C. Bernard, 69662 Villeurbanne cedex, France; Department of Physics, Stockholm University, 10691 Stockholm, Sweden

Abstract: This work investigates the dark matters structures that form on the smallest cosmological scales. We find that the types and abundances of structures which form at approximately Earth-mass scales are very sensitive to the nature of dark matter. We explore various candidates for dark matter and determine the corresponding properties of small-scale structure. In particular, we discuss possibilities for indirect detection of dark matter through small-scale structure, and comment on the potential of these methods for discriminating between dark matter candidates.

Year: 2007
Source title: Les Houches Summer School Proceedings
Volume: 86
Page : 503-509
Link: Scorpus Link
Correspondence Address: Siegel, E.R.; Department of Physics, University of Wisconsin, 1150 University Avenue, Madison, WI 53706, United States
Editors: Bernardeau F.Grojean C.Dalibard J.
ISSN: 9248099
ISBN: 9.78E+12
DOI: 10.1016/S0924-8099(07)80039-4
Language of Original Document: English
Abbreviated Source Title: Les Houches Summer School Proceedings
Document Type: Article
Source: Scopus
Authors with affiliations:

1. Siegel, E.R., Department of Physics, University of Wisconsin, 1150 University Avenue, Madison, WI 53706, United States
2. D'Amico, G., Department of Physics, Scuola Normale Superiore, Pisa, 56100, Italy
3. Di Napoli, E., Department of Physics and Astronomy, University of North Carolina, CB#3255 Phillips Hall, Chapel Hill, NC 27599, United States
4. Fu, L., Joint Center of Astrophysics, Shanghai Normal University, 200234 Shanghai, China

5. Hertzberg, M.P., Center for Theoretical Physics, MIT, Cambridge, MA 02139, United States
6. Huong, N.T.T., Centre for High Energy Physics, Vietnam National University - Hanoi, 334 Nguyen Trai Street, Hanoi, Viet Nam
7. Palorini, F., Universit?? C. Bernard, 69662 Villeurbanne cedex, France
8. Sellerholm, A., Department of Physics, Stockholm University, 10691 Stockholm, Sweden

References:

1. Fukugita, M., Peebles, P.J.E., (2004) Astrophys. J., 616, p. 643
2. van der Marel, R.P., Magorrian, J., Carlberg, R.G., Yee, H.K.C., Ellingson, E., (2000) Astron. J., 119, p. 2038
3. Brainerd, T.G., Specian, M.A., (2003) Astrophys. J., 593, pp. L7
4. Heymans, C., (2006) Mon. Not. Roy. Astron. Soc. Lett., 371, pp. L60
5. Peacock, J.A., (2001) Nature, 410, p. 169
6. D.N. Spergel et al., arXiv:astro-ph/0603449A.G. Riess et al., arXiv:astro-ph/0611572Bertone, G., Hooper, D., Silk, J., (2005) Phys. Rept., 405, p. 279
7. Miller, C.J., Nichol, R.C., Chen, X.l., (2002) Astrophys. J., 579, p. 483
8. Alcock, C., MACHO Collaboration (1998) Astrophys. J., 499, pp. L9
9. Fields, B.D., Olive, K.A., (2006) Nuc. Phys. A, 777, p. 208
10. D. Clowe, M. Bradac, A.H. Gonzalez, M. Markevitch, S.W. Randall, C. Jones and D. Zaritsky, arXiv:astro-ph/0608407Viel, M., Lesgourgues, J., Haehnelt, M.G., Matarrese, S., Riotto, A., (2005) Phys. Rev. D, 71, p. 063534
11. Peccei, R.D., Quinn, H.R., (1977) Phys. Rev. Lett., 38, p. 1440
12. Dubovsky, S.L., Tinyakov, P.G., Tkachev, I.I., (2005) Phys. Rev. Lett., 94, p. 181102
13. Green, A.M., Hofmann, S., Schwarz, D.J., (2005) JCAP, 508, p. 003
14. Loeb, A., Zaldarriaga, M., (2005) Phys. Rev. D, 71, p. 103520
15. Bertschinger, E., (2006) Phys. Rev. D, 74, p. 063509
16. K.M. Zurek, C.J. Hogan and T.R. Quinn, arXiv:astro-ph/0607341Diemand, J., Moore, B., Stadel, J., (2005) Nature, 433, p. 389
17. T. Goerdt, O.Y. Gnedin, B. Moore, J. Diemand and J. Stadel, arXiv:astro-ph/0608495E.R. Siegel, J.N. Fry and M.P. Hertzberg, in preparation