References

[1] Askaryan G. A., *ZhETF*, **41** (1961), 616; Askar'yan G. A., *Sov. Phys. JETP*, **14** (1962), 441
[2] Askar'yan G. A., *Sov. Phys. JETP*, **21** (1965), 658 ads*
[3] Kahn F. D., Lerche I., *Proc. R. Soc. Lond. A*, **289** (1966), 206 crossref ads*
[4] Jelley J. V. et al., *Nature*, **205** (1965), 327 crossref ads*
[5] Filonenko A. D., *Phys. Usp.*, **45** (2002), 403 Math-Net.Ru crossref crossref ads* WEB OF SCIENCE™
[6] Allan H. R., *Acta Phys. Hung.*, **29**:Suppl. 1 (1970)
[7] Gusev G. A., Zheleznykh I. M., *JETP Lett.*, **38** (1983), 611 ads* WEB OF SCIENCE™
[8] Hankins T. H., Ekers R. D., O'Sullivan J. D., *Mon. Not. R. Astron. Soc.*, **283** (1996), 1027 crossref ads*
[9] Filonenko A. D., *Phys. Usp.*, **55** (2012), 741 Math-Net.Ru crossref crossref WEB OF SCIENCE™ eLIBRARY.RU eLIBRARY.RU
[10] Rosner J. L., arXiv: hep-ex/9508011
[11] Rosner J. L., Wilkerson J. F., arXiv: hep-ex/9702008
[12] Rosner J. L., Suprun D. A., *AIP Conf. Proc.*, **579** (2001), 81 crossref ads* WEB OF SCIENCE™; arXiv: astro-ph/0101089
[13] Antoni T. et al., *Nucl. Instrum. Meth. Phys. Res. A*, **513** (2003), 490 crossref ads* WEB OF SCIENCE™
[14] Navarra G. et al., *Nucl. Instrum. Meth. Phys. Res. A*, **518** (2004), 207 crossref ads* WEB OF SCIENCE™
[15] Horneffer A. et al., arXiv: astro-ph/0409641
[16] Petrovic J. et al. (LOPES Collab.), *J. Phys. Conf. Ser.*, **39** (2006), 471 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU; arXiv: astro-ph/0611225
[17] Falcke H. et al., *Nature*, **435** (2005), 313 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU
[18] Apel W. D. et al., *Astropart. Phys.*, **32** (2010), 294 crossref ads* WEB OF SCIENCE™
[19] Huege T., Ulrich R., Engel R., *Astropart. Phys.*, **30** (2008), 96 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU
[20] Apel W. D. et al. (LOPES Collab.), *Astropart. Phys.*, **26** (2006), 332 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU
[21] Haungs A. et al. (LOPES Collab.), *Nucl. Instrum. Meth. Phys. Res. A*, 2009, 1 crossref WEB OF SCIENCE™; arXiv: astro-ph/0811.1919
[22] Horneffer A. et al. (LOPES Collab.), *Proc. of the 30th Intern. Cosmic Ray Conf. July 3 - 11, 2007, Mérida, Yucatán, Mexico*, **4**, R. Caballero et al., Univ. Nacional Autonoma de Mexico, Mexico City, Mexico, 2008
[23] Nigl A. et al. (LOPES Collab.), *Astron. Astrophys.*, **487** (2008), 781 crossref WEB OF SCIENCE™
[24] Palmieri N. et al., *Proc. of the 32nd Intern. Cosmic Ray Conf., ICRC2011, 11 - 18 August, 2011, Beijing, China*, **4**, 60
[25] Apel W. D. et al. (LOPES Collab.), *Phys. Rev. D*, **85** (2012), 071101(R) crossref ads* WEB OF SCIENCE™; arXiv: 1203.3971
[26] Apel W. D. et al. (LOPES Collab.), *Astropart. Phys.*, **50–52** (2013), 76 crossref ads* WEB OF SCIENCE™; arXiv: 1309.5920
[27] Apel W. D. et al., *Nucl. Instrum. Meth. Phys. Res. A*, **696** (2012), 100 crossref ads* WEB OF SCIENCE™; arXiv: 1303.6808

[28] Huber D. et al., arXiv: 1308.2512

[29] Ravel O. et al., *Nucl. Instrum. Meth. Phys. Res. A*, **518** (2004), 213 crossref ads* WEB OF SCIENCE™; arXiv: astro-ph/0306255

[30] Ardouin D. et al., *Nucl. Instrum. Meth. phys. Res. A*, **572** (2007), 481 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[31] Lebrun D. and the CODALEMA Collab., *Proc. of the 30th Intern. Cosmic Ray Conf. July 3 - 11, 2007, Mérida, Yucatán, Mexico*, Merida, Mexico, 2007

[32] Riviere C. (for the CODALEMA Collab.), arXiv: 0906.2720

[33] Revenu B. (for the CODALEMA Collab.), arXiv: 0906.2832

[34] arXiv: 1109.3579

[35] Rebai A. and the CODALEMA Collab., arXiv: 1211.3273

[36] Gandhi R. et al., *Astropart. Phys.*, **5** (1996), 81 crossref ads* WEB OF SCIENCE™; arXiv: hep-ph/9512364

[37] Gandhi R. et al., *Phys. Rev. D*, **58** (1998), 093009 crossref ads* WEB OF SCIENCE™; arXiv: hep-ph/9807264

[38] Brusoval O. et al., arXiv: 0708.3824

[39] Ardouin D. et al., *Astropart. Phys.*, **34** (2011), 717 crossref ads* WEB OF SCIENCE™; arXiv: 1007.4359

[40] Ardouin D. et al., *Nucl. Instrum. Meth. Phys. Res. A*, **604** (2009), S85 crossref ads* WEB OF SCIENCE™

[41] Carloganu C. et al., *Proc. of the 44th Rencontres de Moriond, La Thuile, Italy 2009*

[42] Lamblin J. and the CODALEMA Collab., *Proc. of the 30th Intern. Cosmic Ray Conf. July 3 - 11, 2007, Mérida, Yucatán, Mexico*, **5**, R. Caballero et al., Univ. Nacional Autonoma de Mexico, Mexico City, Mexico, 2008, 921 ads*

[43] Ardouin D. et al., arXiv: 0902.0730

[44] Ardouin D. et al., *Astropart. Phys.*, **31** (2009), 192 crossref ads* WEB OF SCIENCE™; arXiv: 0901.4502

[45] van den Berg A. M. for the Pierre Auger Collab., arXiv: 0708.1709

[46] Huege T. for the Pierre Auger Collab., *Nucl. Instrum. Meth. Phys. Res. A*, **617** (2010), 484 crossref ads* WEB OF SCIENCE™; arXiv: 0906.4970

[47] Klages H. O., *Proc. of the 30th Intern. Cosmic Ray Conf. July 3 - 11, 2007, Mérida, Yucatán, Mexico*, **5**, R. Caballero et al., Univ. Nacional Autonoma de Mexico, Mexico City, Mexico, 2008, 849 ads*

[48] Etchegoyen A., *Proc. of the 30th Intern. Cosmic Ray Conf. July 3 - 11, 2007, Mérida, Yucatán, Mexico*, **5**, R. Caballero et al., Univ. Nacional Autonoma de Mexico, Mexico City, Mexico, 2008, 1191 ads*

[49] Huege T., *Nucl. Instrum. Meth. Phys. Res. A*, **604**:1–2 (2009), S57 crossref ads* WEB OF SCIENCE™

[50] Abreu P. et al. (Pierre Auger Collab.), arXiv: 1107.4807

[51] Abreu P. et al., *JINST*, **7** (2012), P10011 crossref ads* WEB OF SCIENCE™; arXiv: 1209.3840

[52] Schröder F. G., Asch T., Bähren L., *Nucl. Instrum. Meth. Phys. Res. A*, **615** (2010), 277 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[53] Aab A. et al. (The Pierre Auger Collab.), *33rd Intern. Cosmic Ray Conf., Rio de Janeiro, Brazil, July 2013, The Astroparticle Physics Conf.*

[54] Huege T., Ludwig T. M., James C., *Proc. 5th ARENA, Erlangen, Germany*; *AIP Conf. Proc.*, **1535** (2013), 128 crossref ads* WEB OF SCIENCE™

[55] Alvarez-Muniz J., Carvalho W. R., Zas E. (Jr.), *Astropart. Phys.*, **35** (2012), 325 crossref ads* WEB OF SCIENCE™

[56] Marin V., Revenu B., *Astropart. Phys.*, **35** (2012), 733 crossref ads* WEB OF SCIENCE™

[57] Werner K., Vries K. D., Scholten O., *Astropart. Phys.*, **37** (2012), 5 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[58] Ardouin D. et al., *Astropart. Phys.*, **31** (2009), 192 crossref ads* WEB OF SCIENCE™

[59] Glaser S., Weidenhaupt K., *ARENA-2012, Acoustic and Radio EeV Neutrino Detection Activities, Erlangen, Germany*

[60] Aab A. et al. (The Pierre Auger Collab.), arXiv: 1307.5059

[61] Louedec K. for the Pierre Auger Collab., arXiv: 1310.4603

[62] Gorham P. W. et al., arXiv: 0705.2589

[63] Gorham P. W. et al., *Phys. Rev. D*, **78** (2008), 032007 crossref ads* WEB OF SCIENCE™

[64] Belz J. for the FLASH Collab., *Proc. of the 29th Intern. Cosmic Ray Conf., August 3 - 10, 2005, Pune, India*, **8**, B. Sripathi Acharya et al., Tata Institute of Fundamental Research, Mumbai, 2005, 291 ads*; arXiv: astro-ph/0507379

[65] Monasor M., Bohacova M., Bonifazi C., *Proc. of the 32nd Intern. Cosmic Ray Conf., ICRC2011, 11 - 18 August, 2011, Beijing, China*, **3**, 196

[66] arXiv: 1108.0588

[67] Apel W. D. et al., *Nucl. Instrum. Meth. Phys. Res. A*, **620** (2010), 202 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[68] Šmida R. et al., arXiv: 1306.6738

[69] Šmida R. et al., *EPJ Web Conf.*, **53** (2013), 08010 crossref WEB OF SCIENCE™

[70] Alvarez-Muñiz J. et al., *Phys. Rev. D*, **86** (2012), 051104(R) crossref ads* WEB OF SCIENCE™ eLIBRARY.RU; arXiv: 1205.5785

[71] Gaisser T. K., Hillas A. M., *Proc. of the 15th Intern. Cosmic Ray Conf. Plovdiv, 1977*, **8**, 353

[72] Alvarez-Muñiz J. et al., *Phys. Rev. D*, **86** (2012), 123007 crossref ads* WEB OF SCIENCE™; arXiv: 1208.0951

[73] Facal P. for the Pierre Auger Collab., *EPJ Web Conf.*, **53** (2013), 08009 crossref WEB OF SCIENCE™

[74] Allison P. S., for the Pierre Auger Collab., *Proc. of the 32nd Intern. Cosmic Ray Conf., ICRC2011, 11 - 18 August, 2011, Beijing, China*

[75] Conti E., Collazuo G., Sartori G., *Phys. Rev. D*, **90** (2014), 071102(R) crossref ads* WEB OF SCIENCE™; arXiv: 1408.5886

[76] Schröder F. G. et al. (Tunka-Rex Collab.), arXiv: 1308.0910

[77] Hörandel J. R. et al., *Nucl. Instrum. Meth. Phys. Res.*, **630** (2011), 171 crossref ads* WEB OF SCIENCE™; arXiv: 0911.2371

[78] Schröder F. G. et al., *AIP Conf. Proc.*, **1535** (2013), 78 crossref ads* WEB OF SCIENCE™

[79] Glaser C., for the Pierre Auger Collab., *AIP Conf. Proc.*, **1535** (2013), 68 crossref ads* WEB OF SCIENCE™

[80] Rebai A. et al., arXiv: 1210.1739

[81] Allan H. R., *Prog. Elem. Part. Cosmic Ray Phys.*, **171** (1971), 10

[82] Apel W. D. et al. (LOPES Collab.), *Phys. Rev. D*, **85** (2012), 071101(R) crossref ads* WEB OF SCIENCE™

[83] Vries K. D. et al., *Astropart. Phys.*, **34** (2010), 267 crossref ads* WEB OF SCIENCE™

[84] Ludwig M., Huege T., *Astropart. Phys.*, **34** (2011), 438 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[85] Buitink S. et al., *Astropart. Phys.*, **33** (2010), 296 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[86] Scholten O., Werner K., Rusydi F., *Astropart. Phys.*, **29** (2008), 94 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[87] Werner K., Scholten O., *Astropart. Phys.*, **29** (2008), 393 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[88] Werner K., de Vries K. D., Scholten O., *Astropart. Phys.*, **37** (2012), 5 crossref ads* WEB OF SCIENCE™ eLIBRARY.RU

[89] Huege T. et al., *Nucl. Instrum. Meth. Phys. Res. A*, **662** (2012), S179 ads*

[90] Scholten O., Werner K., Rusydi F., *Astropart.Phys.*, **29** (2008), 94 crossref ads* WEB OF SCIENCE eLIBRARY.RU; arXiv: 0709.2872

[91] Greisen K., *Prog. Cosmic Ray Phys.*, **3** (1956), 1

[92] Kamata K., Nishimura J., *Prog. Theor. Phys. Suppl.*, **6** (1958), 93 crossref ads*

[93] Khristiansen G. B., Kulikov G. V., Fomin Yu. A., *Kosmicheskoe izluchenie sverkhvysokoi energii*, Atomizdat, M., 1975; Khristiansen G. B., Kulikov G., Fomin J., *Cosmic Rays of Superhigh Energies*, Verlag Karl Thiemig, München, 1980

[94] Belenkii S. Z., *Lavinnye protsessy v kosmicheskikh luchakh*, Gostekhizdat, M., 1948

[95] De Vries K. D. et al., *Phys. Rev. Lett.*, **107** (2011), 061101 crossref ads* WEB OF SCIENCE; arXiv: 1107.0665

[96] Werner K., De Vries K. D., Sholten O., arXiv: 1201.4471

[97] Falcke N., Gorham P., *Astropart. Phys.*, **19** (2003), 477 crossref ads* WEB OF SCIENCE; arXiv: astro-ph/0207226

[98] Huege T., Falcke N., *Astron. Astrophys.*, **412** (2003), 19 crossref WEB OF SCIENCE

[99] Jackson J. D., *Classical Electrodynamics*, Wiley, New York, 1962 ads*; Dzhekson Dzh., *Klassicheskaya elektrodinamika*, Mir, M., 1965

[100] Agnetta G. et al., *Astropart. Phys.*, **6** (1997), 301 crossref ads* WEB OF SCIENCE

[101] Atrashkevich V. B. et al., *Sov. J. Nucl. Phys.*, **28** (1978), 366

[102] Huege T., Falcke N., *Astron. Astrophys.*, **430** (2005), 779 crossref WEB OF SCIENCE eLIBRARY.RU

[103] Filonenko A. D., *JETP Lett.*, **97** (2013), 178 Math-Net.Ru crossref ads* WEB OF SCIENCE eLIBRARY.RU

[104] Murzin V. S., *Vvedenie v fiziku kosmicheskikh luchei*, Izd-vo MGU, M., 1988

[105] Kalmykov N. N., *31-ya Vserossiiskaya konf. po kosmicheskim lucham, Moskva, 5 - 9 iyulya, 2010*, Izd-vo MGU, M., 2010

[106] Blackett P. M. S., Lovell A. C. B., *Proc. R. Soc. Lond. A*, **177** (1941), 183 crossref ads*

[107] Gorham P. W., *Astropart. Phys.*, **15** (2001), 177 crossref ads* WEB OF SCIENCE; arXiv: hep-ex/0001041

[108] Hayakawa S., *Cosmic Ray Physics*, Wiley-Intersci., New York, 1969 ads*; Khayakava S., *Fizika kosmicheskikh luchei*, Mir, M., 1973

[109] Rossi B., Greisen K., *Rev. Mod. Phys.*, **13** (1941), 240 crossref ads*; Rossi B., Greizen K., *Vzaimodeistvie kosmicheskikh luchei s veschestvom*, IL, M., 1948

[110] Grupen C., *Particle Detectors*, Cambridge Univ. Press, Cambridge, 1996; Grupen K., *Detektory elementarnykh chastits*, Sib. khronograf, Novosibirsk, 1999

[111] Raizer Yu. P., *Fizika gazovogo razryada*, Nauka, M., 1992; Raizer Yu. P., *Gas Discharge Physics*, Springer, Berlin, 1997

[112] Aizenberg G. Z., *Antenny ultrakorotkikh voln*, Svyazizdat, M., 1957

[113] Bakunov M. I. et al., *Astropart. Phys.*, **33** (2010), 335 crossref ads* WEB OF SCIENCE eLIBRARY.RU

[114] Bakunov M. I., Novokovskaya A. L., *Vestn. Nizhegorodskogo un-ta im. Lobachevskogo*, 2011, no. 5(3), 160

[115] Takai H. et al., *32th ICRC Beijing*, 2011

[116] Abou Bakr Othman et al., *Proc. of the 32nd Intern. Cosmic Ray Conf., ICRC2011, 11 - 18 August, 2011, Beijing, China*

[117] Abou Bakr Othman et al., *33rd Intern. Cosmic Ray Conf., Rio de Janeiro, Brazil, July 2013*

[118] Stasielak J. et al., *EPJ Web Conf.*, **53** (2013), 08013 crossref WEB OF SCIENCE; arXiv: 1210.1427

[119] Stasielak J. et al., arXiv: 1310.0743

[120] Filonenko A. D., *JETP*, **117** (2013), 641 crossref ads* WEB OF SCIENCE eLIBRARY.RU

[121] Engel A., *Ionized Gases*, Clarendon Press, Oxford, 1955; Engel A., *Ionizovannye gazy*, Fizmatgiz, M., 1959

[122] Raizer Yu. P., *Osnovy sovremennoi fiziki gazorazryadnykh protsessov*, Nauka, M., 1980

[123] Ginzburg V. L., *Rasprostranenie elektromagnitnykh voln v plazme*, Fizmatgiz, M., 1960; Ginzburg V. L., *The Propagation of Electromagnetic Waves in Plasmas*, Pergamon Press, Oxford, 1964

[124] Jelley J. V. et al., *Nuovo Cimento A*, **46** (1966), 649

[125] Alvarez-Muñiz J. et al., *EPJ Web Conf.*, **53** (2013), 08011

[126] Filonenko A. D., *JETP Lett.*, **99** (2014), 250

[127] Landau L. D., Lifshits E. M., *Teoriya polya*, Nauka, M., 1967, 460; Landau L. D., Lifshitz E. M., *The Classical Theory of Fields*, Pergamon Press, Oxford, 1975

[128] Scholten O., de Vries K. D., Werner K., *EPJ Web of Conf.*, **53** (2013), 08005; arXiv: 1207.1874

[129] Suprun D. A., Gorham P. W., Rosner J. L., *Astropart. Phys.*, **20** (2003), 157; arXiv: astro-ph/0211273

[130] Vedeneev O. V., Kalmykov N. N., Konstantinov A. A., "Sravnenie eksperimentalnykh i raschetnykh prostranstvennykh raspredelenii radioizlucheniya ShAL po dannym MGU i LOPES", *31-ya Vserossiiskaya konf. po kosmicheskim lucham, Moskva, 5 - 9 iyulya, 2010*, Izd-vo MGU, M., 2010

[131] Kalmykov N. N., Konstantinov A. A., Engel R., *Phys. Atom. Nucl.*, **73** (2010), 1191

[132] Kalmykov N. N., Konstantinov A. A., *Phys. Atom. Nucl.*, **74** (2011), 1019

[133] Nehls S., Dissertation, Institut für Experimentelle Kernphysik, Karlsruhe, 2008

[134] Huege T., Ulrich R., Engel R., *Astropart. Phys.*, **30** (2008), 96; arXiv: 0806.1161

[135] Apel W. D. et al. (LOPES Collab.), *Phys. Rev. D*, **90** (2014), 062001; arXiv: 1408.2346

[136] Huege T., *Braz. J. Phys.*, **44** (2014), 520

[137] Apel W. D. et al. (The LOPES Collab.), *Astropart. Phys.*, **50–52** (2013), 76

[138] Palmieri N. et al. (The LOPES Collab.), *AIP Conf. Proc.*, **1535** (2012), 89

[139] Huege T. et al. (The LOPES Collab.), *Nucl. Instrum. Meth. Phys. Res. A*, **662** (2010), S72

[140] Matthews J., *Astropart. Phys.*, **22** (2004), 387

[141] *33rd Intern. Cosmic Ray Conf., Rio de Janeiro, Brazil, July 2013*, 579

[142] Dagkesamanskii R. D., Zheleznykh I. M., *JETP Lett.*, **50** (1989), 259

[143] Gusev G. A. et al., *Phys. Usp.*, **53** (2010), 915