









220 ? ????????? ?????? ?????????, ?? ??????? ?? ?????? ?????? ?????. ?????????? ?????????? ???????????, ??? ?????  
221 ?????? ??? ? ?????????? 0 ? z ? 1.2 ?????????? ?????? ? 7 ???, ? ? ?????????? 0 ? z ? 2 -? 20 ????. ???  
222 ?????? ?????????? ? ?????????????? ??????????? ?????? ??? ? ?????????????? ????????????? [25,26], ??? ? ???????  
223 ??????????? ?????? ?? ? ?????????? ?????????? ?? ??????????? ?? ???.

224 ?????????? ?????????? ?D?”, ?????????????? ? ?????? ??????, ? ?????????????? ?????????????? ?????????? ?D?”,  
225 ??????????? ? ?????? ??????, ???????????, ??? ? ?????????? ??????????? ?????????? z ??????? ???????????  
226 ?????????????????????? ???????????. ??? ? ?????????????????????? ?????? [34], ?????????????? ?? ?????????????  
227 ?????????????????????? ??????, ??? ??? ?????????????????? ?????, ?????? 2,96 ?????? ?????????????????????? ??????????  
228 ? ?????????? ?????????? 1 ? z ? 4.5. ??? ?????? ?? ?????? ?????????? ?????????? ?????????? ?????????? ?? ??????  
229 [34] ?????? ?????????? ?? ?????????? ?????????? ?? ?????????? ?????????? ??????. D?”? ?????????? ??? ??????  
230 ?????????????? ?????????? ?????? ??? ?D?” ?????????? ?????????? ?????????? ?????????? ?????????? ??  
231 ??? ? z ? 4.5.

232 ?????????, ??? ?????????? ?????? ??????? ?????????? ? ?????? ??????? ?? ?????? ?????????? ? ?????????? ?????  
233 ??? ?????? ????. ?????????? ?????????? ?????????? ?????????????? ??????? ?? ?????????? ??????????????????????. ??????  
234 ?????, ??? ? ?????????? ?????? ?????? ?????? ?????????????? ?? ??????????, ? ?????????? ?????????? ??????? ??  
235 ?????????????????? ?? ??????? ?????????? ?????? ???.

## 11 ?????????? ??????????

236 London Journal  
237 of Research in Science: Natural and Formal <sup>1 2 3</sup>



Figure 1:

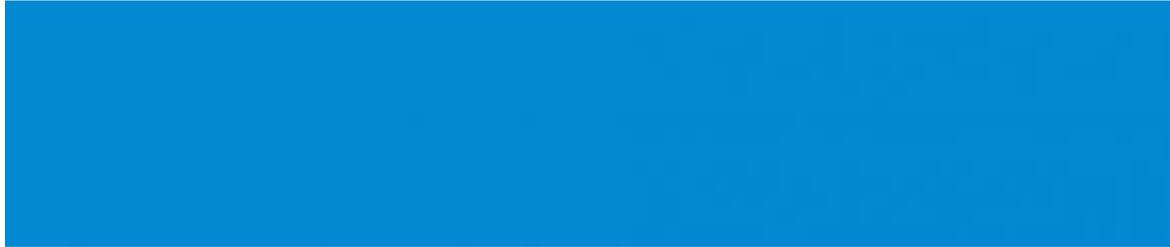


Figure 2:

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<sup>2</sup> © 2023 Great ] Britain Journals Press  
<sup>3</sup> © 2023 Great ] Britain Journals Press



Figure 3:



4

Figure 4: 4 )





Figure 6:

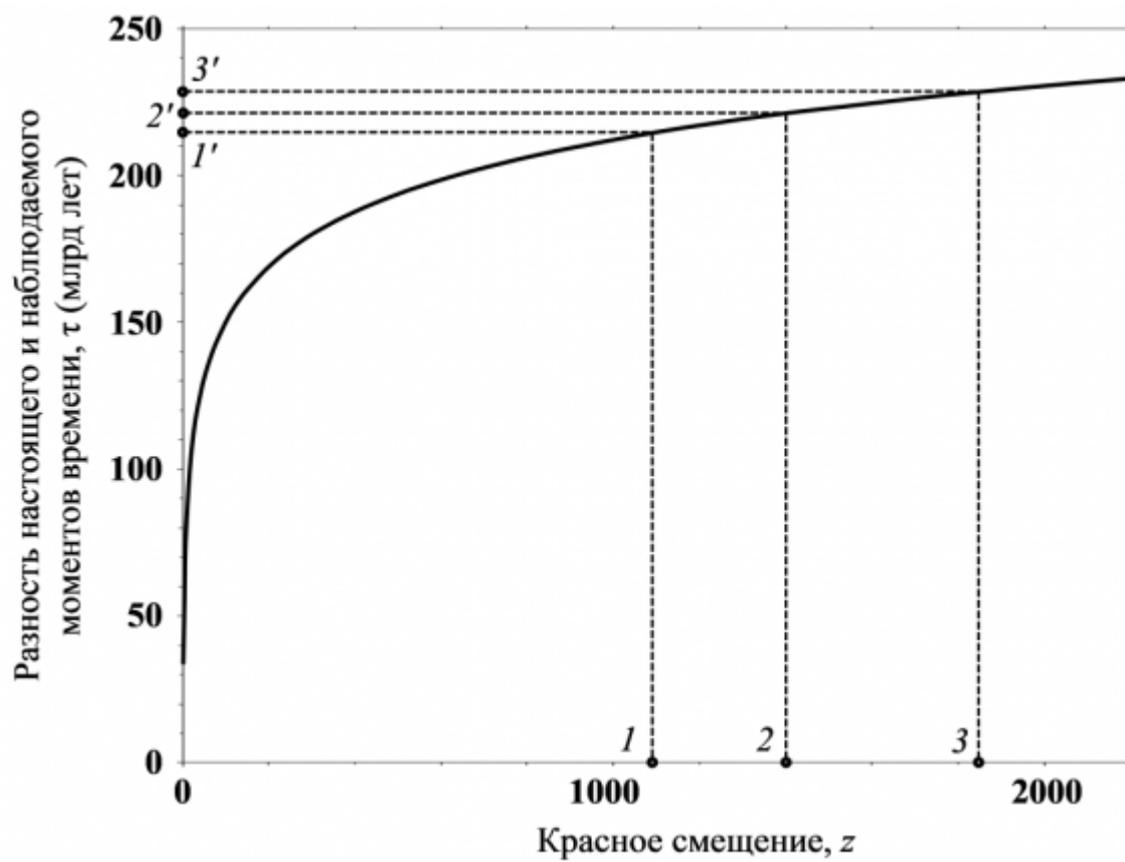


Figure 7:

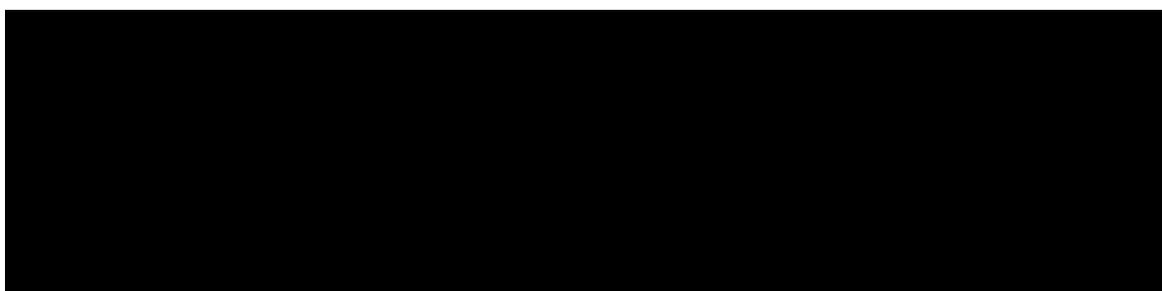


Figure 8:

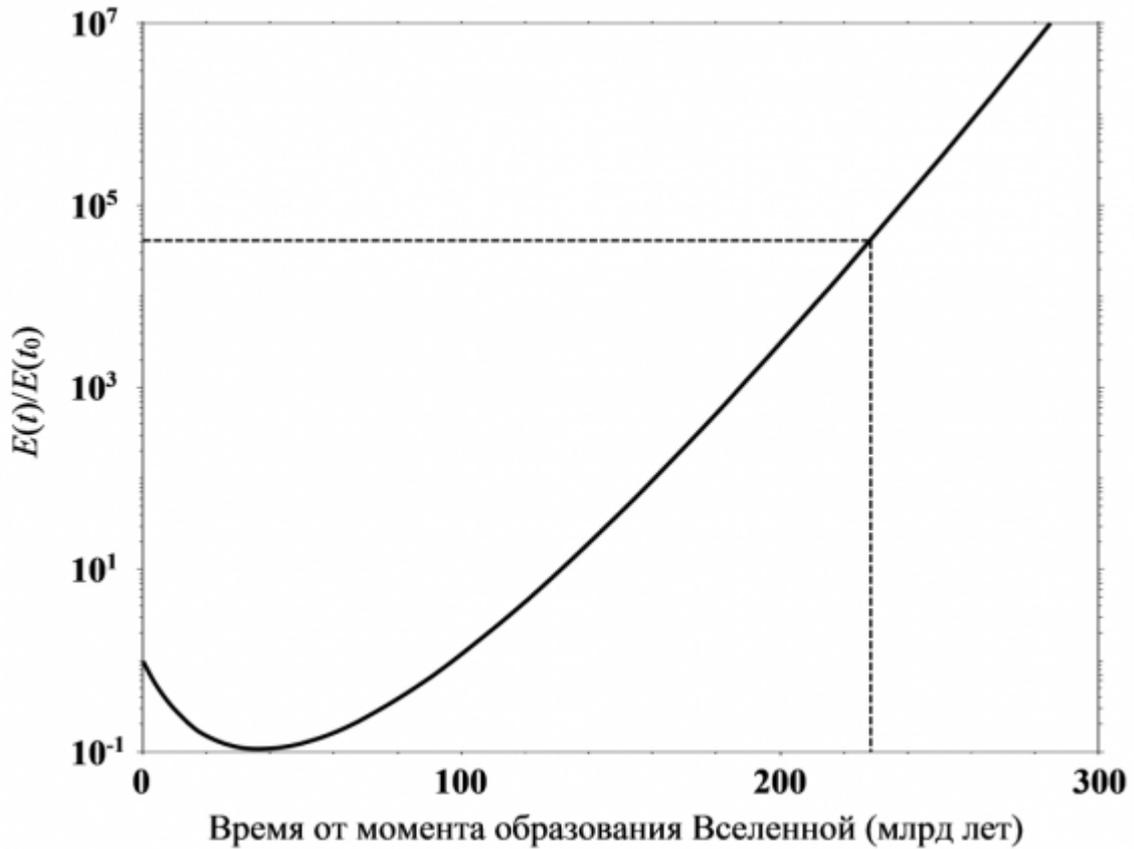


Figure 9:

???????????? ????????? ???? ?D?", ????????????? ? ?????? [33], ? ?????  
 ?????????????,  
 ?????????????, ?????????, ? [27], ??????????, ??? ? ????? ??????, ????????? ?????  
 ?D?" ??  
 ??????? ??????? ?? ?????? ?D?". ?????????????, ????????????? ? ?????? ??????,  
 ????????? ?  
 ??????????, ??? ????????? ???? ?D?" ?? ??????? ?? ?????? ?D?", ? ??????? ?  
 ??????????????? ?  
 ????????? ? ????????????? ???? ?? ??? ??????? ?? ????????? ????????? ????????? ?  
 4-?????? ???? ?  
 ????????? ????????????? ??????????. ? ?????????? ?????????? 0 ? z ? 10 ????????? ?????  
 ?D?"  
 ????????????? ?? ??????? ?? ???? ?????????, ????????????? ? ??? ??? ?????????  
 ??????????.

Figure 10:



- 295 [Madau et al. ()] ‘High-redshift galaxies in the Hubble Deep Field: color selection and star formation history  
296 to  $z \sim 4$ ’. P Madau , H C Ferguson , M E Dickinson , M Giavalisco , C C Steidel , A Fruchter  
297 . 10.1093/mnras/283.4.1388. <https://doi.org/10.1093/mnras/283.4.1388> *Monthly Notices of the*  
298 *Royal Astronomical Society* 1996. 283 p. .
- 299 [Potemine and Yu ()] ‘Hyperverses, 5-Dimensional Gravity and Multiverses as Nested Gogberashvili Shells’. I  
300 Potemine , Yu . 10.4236/jhepgc.2022.84069. <https://doi.org/10.4236/jhepgc.2022.84069> *Journal*  
301 *of High Energy Physics, Gravitation and Cosmology* 2022. 8 p. .
- 302 [Farrah et al. ()] ‘Observational Evidence for Cosmological Coupling of Black Holes and its Implications for an  
303 Astrophysical Source of Dark Energy’. D Farrah , K S Croker , M Zevin , G Tarlé , V Faraoni , S Petty .  
304 10.3847/2041-8213/acb704. <https://doi.org/10.3847/2041-8213/acb704> *The Astrophysical Journal*  
305 *Letters* 2023. 944 (9) .
- 306 [Gogberashvili ()] ‘Our world as an expanding shell’. M Gogberashvili . 10.48550/arXiv.hep-ph/9812365. <https://doi.org/10.48550/arXiv.hep-ph/9812365> *Europhys.Lett* 2000. 49 p. .
- 308 [Valentino et al. ()] ‘Planck Evidence for a Closed Universe and a Possible Crisis for Cosmology’. Di Valentino , E  
309 Melchiorri , A Silk , J . 10.1038/s41550-019-0906-9. <https://doi.org/10.1038/s41550-019-0906-9>  
310 *Nat Astron* 2020. 4 p. .
- 311 [Planck and the cosmic microwave background] *Planck and the cosmic microwave background*, (ESA). ??????  
312 ?????????: 01 ?????? 2023. European Space Agency.
- 313 [Riess et al. ()] A G Riess , S Casertano , W Yuan , L Macri , J Anderson , J W Mackenty , J B  
314 Bowers . 10.3847/1538-4357/aaadb7. <https://doi.org/10.3847/1538-4357/aaadb7> *New Parallaxes*  
315 *of Galactic Cepheids from Spatially Scanning the Hubble Space Telescope: Implications for the Hubble*  
316 *Constant*, 2018. 855 p. 136.
- 317 [Risaliti and Lusso ()] G Risaliti , E Lusso . 10.48550/arXiv.1811.02590. arXiv:1811.02590v1[astro-ph.CO].  
318 <https://doi.org/10.48550/arXiv.1811.02590> *Cosmological Constraints from the Hubble Diagram*  
319 *of Quasars at high Redshifts*, 2018.
- 320 [Schaefer ()] B E Schaefer . 10.1086/511742. <http://www.arxiv.org/abs/astro-ph/0612285><http://dx.doi.org/10.1086/511742> *The Hubble Diagram to Redshift  $> 6$  from 69 Gamma-Ray Bursts*, 2007.  
321 660 p. .
- 323 [Suzuki et al. ()] A Suzuki , N Rubin , D Lidman , C Aldering , G Amanullah , R Barbary .  
324 10.48550/arXiv.1105.3470. arXiv:1105.3470v1[astro-ph.CO]. [https://doi.org/10.48550/arXiv.1105.](https://doi.org/10.48550/arXiv.1105.3470)  
325 **3470** *The Hubble Space Telescope Cluster Supernova Survey: V. Improving the Dark Energy Constraints*  
326 *Above  $z > 1$  and Building an Early-Type-Hosted Supernova Sample*, 2011.
- 327 [Ni et al. ()] ‘The ASTRID simulation: the evolution of supermassive black holes’. Y Ni , T Di Matteo , S Bird  
328 , R Croft , Yu Feng , N Chen . 10.1093/mnras/stac351. <https://doi.org/10.1093/mnras/stac351>  
329 *Monthly Notices of the Royal Astronomical Society* 2022. 513 p. .
- 330 [Volonteri ()] ‘The formation and evolution of massive black holes’. M Volonteri . 10.1126/science.1220843.  
331 *Science* 2012. 337 p. .