

Dilaton gravity, charged dust, and (quasi-) black holes

Bronnikov K., Fabris J., Silveira R., Zaslavskii O.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We consider Einstein-Maxwell-dilaton gravity with charged dust and interaction of the form $P(\chi)F_{\mu\nu}F^{\mu\nu}$, where $P(\chi)$ is an arbitrary function of the dilaton field χ that can be normal or phantom. For any regular $P(\chi)$, static configurations are possible with arbitrary functions $g_{00}=\exp(2\gamma(x_i))$ ($i=1, 2, 3$) and $\chi=\chi(\gamma)$, without any assumption of spatial symmetry. The classical Majumdar-Papapetrou system is restored by putting $\chi=\text{const}$. Among possible solutions are black-hole (BH) and quasi-black-hole (QBH) ones. Some general results on BH and QBH properties are deduced and confirmed by examples. It is found, in particular, that asymptotically flat BHs and QBHs can exist with positive energy densities of matter and both scalar and electromagnetic fields. © 2014 American Physical Society.

<http://dx.doi.org/10.1103/PhysRevD.89.107501>
