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We investigate the global geometry of  $T^2$ -symmetric spacetimes under low regularity assumptions.

More precisely, denoting by  $R$  the area of the orbits of symmetry, we establish the existence (and the uniqueness within the class under consideration) of a global foliation by the level sets of  $R$  with  $R$  taking all values in the interval  $(0, \infty)$ . Our weak regularity assumptions only require that the first derivatives of  $R$  are bounded while the metric coefficients describing the initial geometry of the orbits of symmetry are in the Sobolev space  $H^1$  and the remaining coefficients have even lower regularity. (Received September 21, 2009)