Correction to: Geometry and topology of the Kerr photon region in the phase space

Carla Cederbaum¹ · Sophia Jahns¹

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The proof of Theorem 10 can be considerably simplified, as was pointed out to us by Gregory J. Galloway: Indeed, it is unnecessary to rule out $L(2; 0)$; since 0 and 2 are not coprime, this case does not need to be considered, which makes it superfluous to argue that P_0 admits a Seifert fibration without exceptional fibers (Proposition 15). Thus, one is left with the case $P_0 \approx L(2; 1) \approx SO(3)$.

From a slightly different point of view, one may also argue as follows: Since P_0 is a closed 3-dimensional manifold with $\pi_1(P_0) = \mathbb{Z}_2$, it is doubly covered by an $\mathbb{S}^3$ (by the Poincaré conjecture). By the elliptization conjecture, this $\mathbb{S}^3$ can be taken to be the standard 3-sphere and the group $\mathbb{Z}_2$ as a subgroup of $SO(3)$ acting on it. (For the statements of the Poincaré and the elliptization conjecture, see [4,5]; for the proofs covering these conjectures see [1–3].) Hence, P_0 is the quotient $\mathbb{S}^3/\mathbb{Z}_2 \approx \mathbb{R}P^3 \approx SO(3)$.

Recalling how P_0 was obtained as a slice $P \cap \{t = 0, p_0 = -1\}$ of the photon region in the phase space, this proves Theorem 10.

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✉ Sophia Jahns
jahns@math.uni-tuebingen.de

Carla Cederbaum
cederbaum@math.uni-tuebingen.de
<http://math.uni-tuebingen.de/cederbaum>

¹ University of Tübingen, Tübingen, Germany

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