Fakultät für Mathematik und Wirtschaftswissenschaften

universität ulm

Mathematisches Kolloquium

Fundamental theorem of arithmetic for the semigroup of metric measure Spaces

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A metric measure space is a complete, separable metric space equipped with a probability measure that has full support. Two such spaces are equivalent if they are isometric as metric spaces via an isometry that maps the probability measure on the first space to the probability measure on the second. We consider the natural binary operation on this space that takes two metric measure spaces and forms their Cartesian product equipped with the sum of the two metrics and the product of the two probability measures. We show that the metric measure spaces equipped with this operation form a cancellative, commutative, Polish semigroup, establishing that there are no infinitely divisible elements and that each element has a unique factorization into prime elements. We establish that there is no analogue of the law of large numbers for sequences of random metric measure spaces and characterize the infinitely divisible probability measures and the Levy processes on this semigroup, characterize the stable probability measures and establish a counterpart of the LePage representation for the latter class.