

**Zbl 737.05006**

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*A problem of Leo Moser about repeated distances on the sphere.* (In English)

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We disprove a conjecture of Leo Moser by showing that (i) for every natural number  $n$  and  $0 < \alpha < 2$  there is a system of  $n$  points on the unit sphere  $S^2$  such that the number of pairs at distance  $\alpha$  from each other is at least  $\text{const} \cdot n \log^* n$  (where  $\log^*$  stands for the iterated logarithm function) (ii) for every  $n$  there is a system of  $n$  points on  $S^2$  such that the number of pairs at distance  $\sqrt{2}$  from each other is at least  $\text{const} \cdot n^{4/3}$ . We also construct a set of  $n$  points in the plane in general position (no 3 on a line, no 4 on a circle) such that they determine fewer than  $\text{const} \cdot n^{\log 3 / \log 2}$  distinct distances, which settles a problem of Erdős.

Classification:

05A05 Combinatorial choice problems

05B30 Other designs, configurations

00A07 Problem books

Keywords:

conjecture of Leo Moser; problem of Erdős