

Physics 596 – Fall 2021

Fermi Problems #1

Solve, as a group, the following Fermi problems: No handbooks, calculators, or computers allowed!

- (1). How many grains of sand are on the earth's beaches?

- (2). How many nails are needed to make sleeping on a bed of nails safe (but still crazy!)?

- (3). Legend has it that water in southern hemisphere washbasins drains in the opposite sense to water draining in northern hemisphere washbasins, i.e., that the Coriolis force, $|F_c| \sim 2m(\omega \times v)$ (where ω is the rotational frequency of the earth, v is the radial speed of the water, and m is the mass of the water), governs the behavior of draining water. Is this legend reasonable? (Hint: Compare your estimate of $|F_c|$ with another force in the problem, i.e., the gravitational force $F_{\text{grav}} = mg$.)