Jointly-sponsored Seminar Event

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Mechanical Engineering
MMEC Seminar Series,

Department of Mathematics
PHYSICAL MATHEMATICS SEMINAR

and

HARVARD UNIVERSITY

School of Engineering and Applied Sciences

"A DAY OF LOCOMOTION"

(The seminar will be held on the Harvard campus.)

STEVE VOGEL

Duke University

BIOBALLISTICS: AN EXERCISE IN SCALING

ABSTRACT:

Biological projectiles range from a 10-micrometer spore to a 1-meter leaping mammal. Pre-launch accelerations scale inversely with length, with that of the smallest projectile approaching a million times gravity. These projectiles follow Borelli's rule, that all jumpers should jump to the same height. Nonetheless, his rationale is wrong on at least two accounts. For one thing, it presumes a muscular engine operating with no energy storage, often far from the case. For another, it ignores drag, critical for small projectiles, which operate in an overwhelmingly drag-dominated rather than gravity-dominated domain, and whose optimal trajectories look decidedly unfamiliar. But the rule can be given quite a different and more general basis. And a simple dimensionless index helps us anticipate best launch angles and path lengths, these latter illustrated with a simple computer simulation.

TUESDAY, OCTOBER 16, 2007
1:30 – 2:00 PM
Radcliffe Gymnasium
Radcliffe Institute for Advanced Study
Harvard University

Directions to Radcliffe Gymnasium:
http://www.radcliffe.edu/about/directions/index.php

For more information:
http://locomotors.wordpress.com/a-day-of-locomotion/

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