



# The Physics of Sports

Fermilab  
Ask A Scientist

David Harding  
6 March 2016

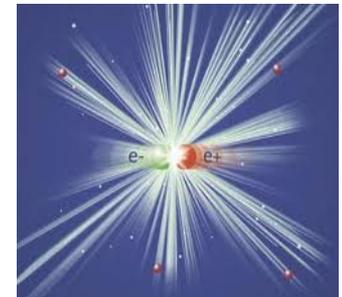
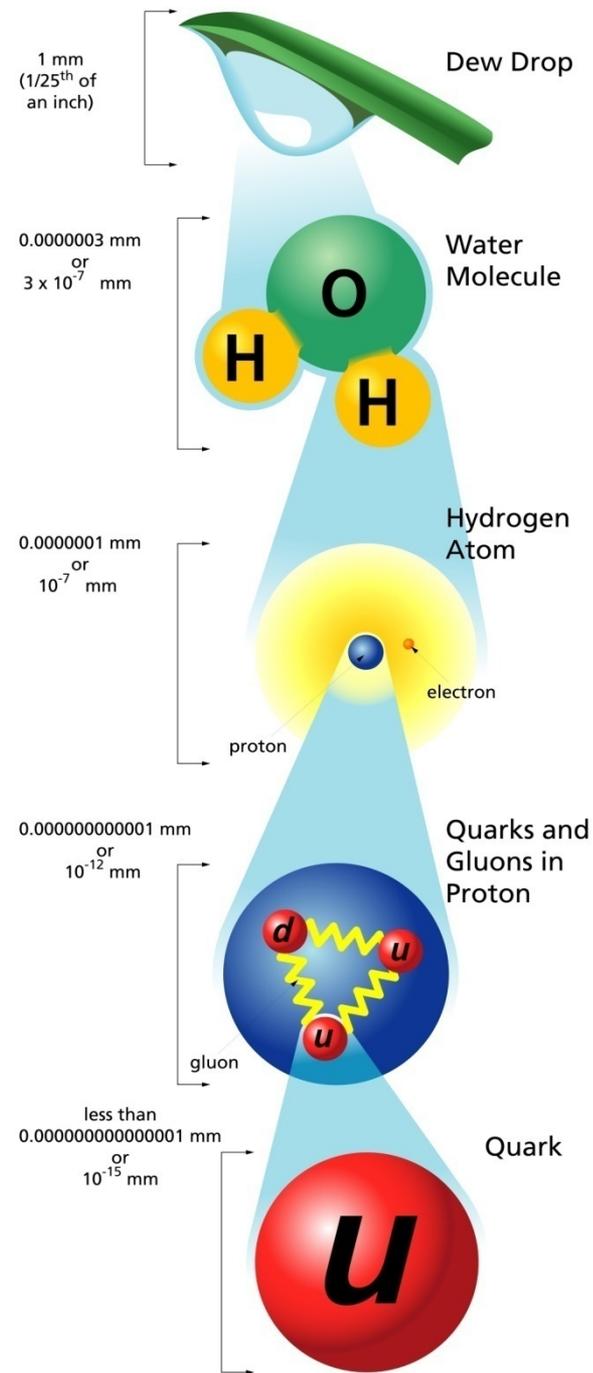
# What is Physics?

Physics is the science that studies matter, forces, energy, and movement.

Scientists try to understand the world around us.

- Sometimes we can use what we already know to understand what we see.
- Sometimes we have to figure out or measure something brand new.
- Sometimes we can use what we know to make something better.

*Physics  
explains  
things that  
are very, very  
small.*



*Physics explains things that are VERY,  
VERY, VERY LARGE.*



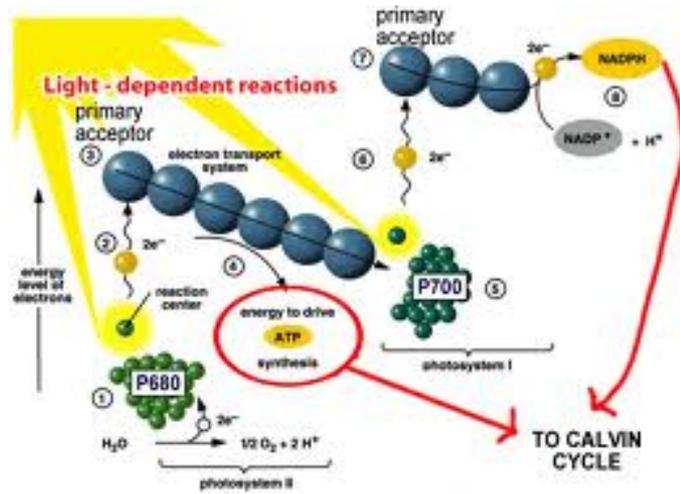
*Physics explains things that are  
right in front of us.*





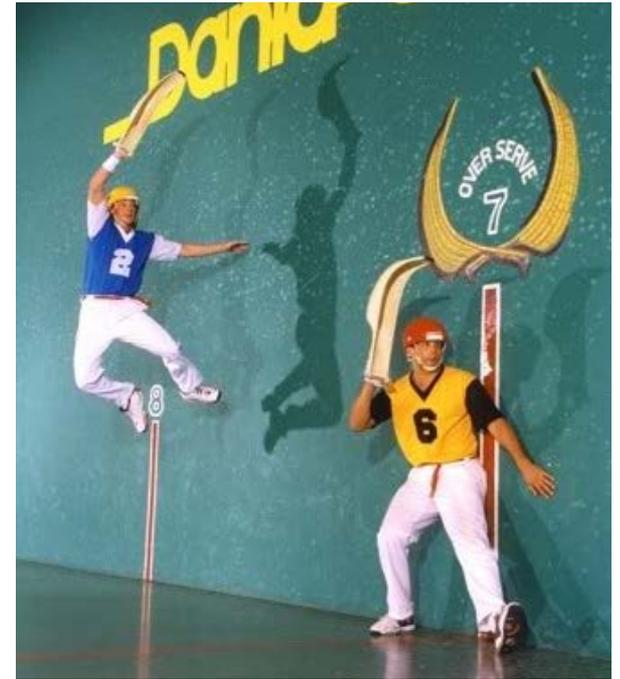
***ENERGY***

# Storing and Converting Energy





How fast  
can you  
throw a  
ball?



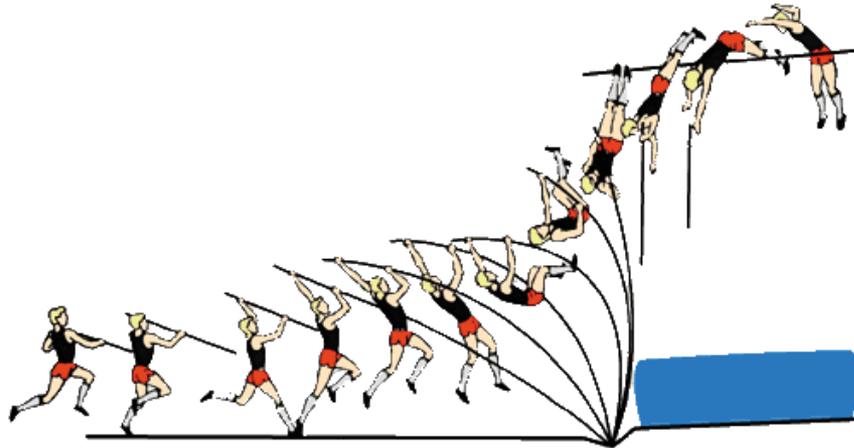
# Energy stored and released



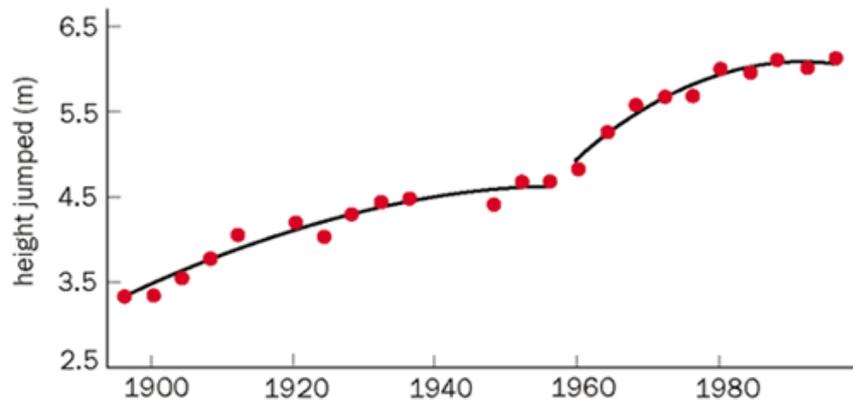
# Hockey Slap Shot



a

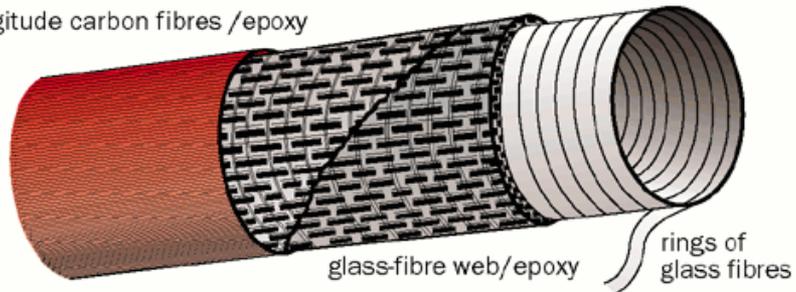


b

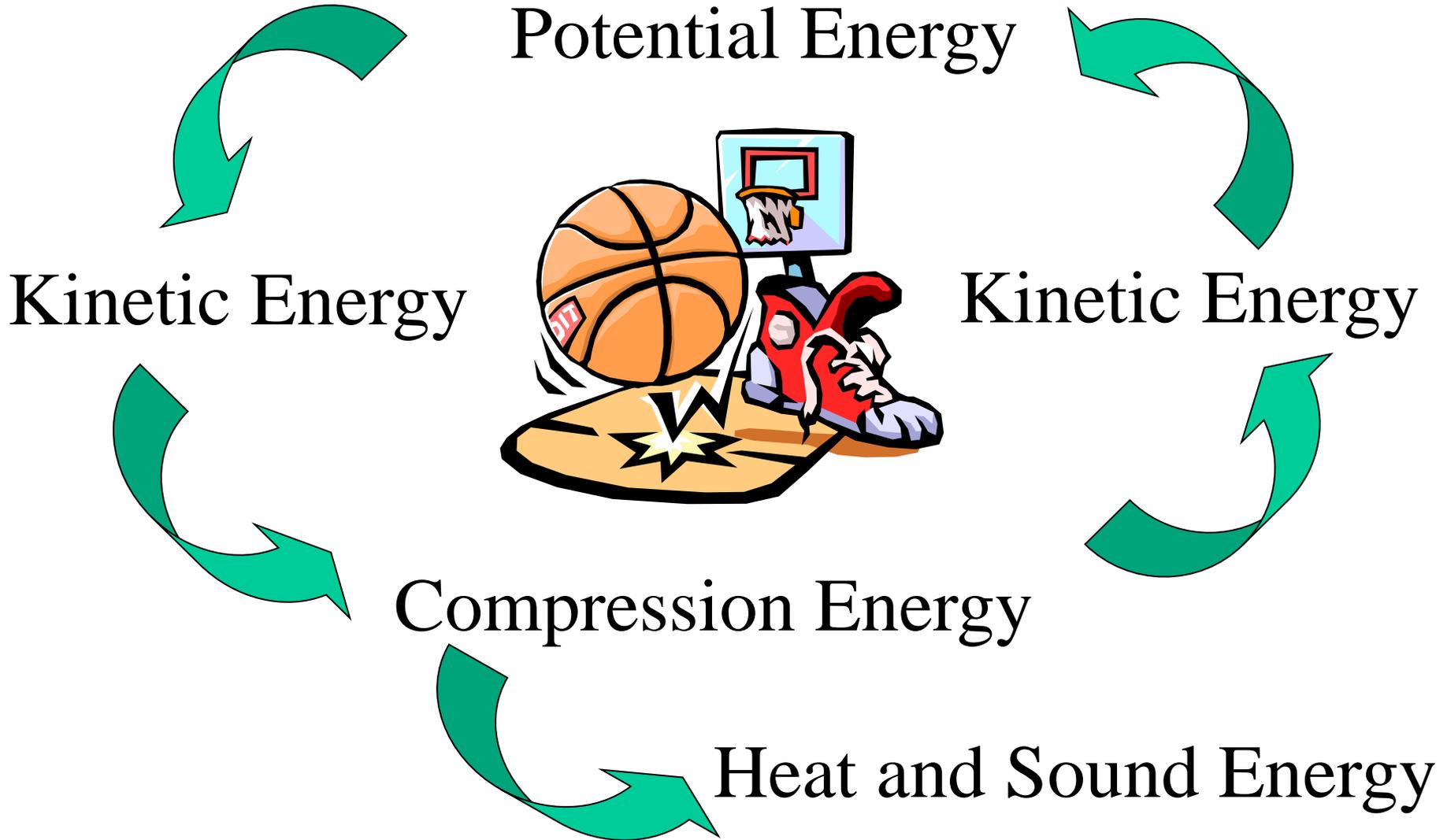


c

longitude carbon fibres / epoxy



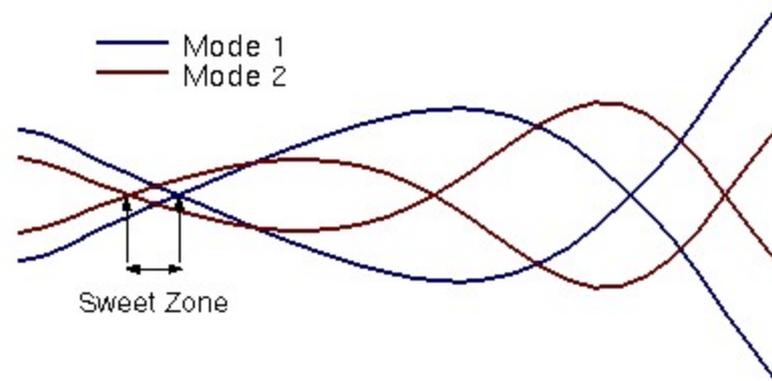
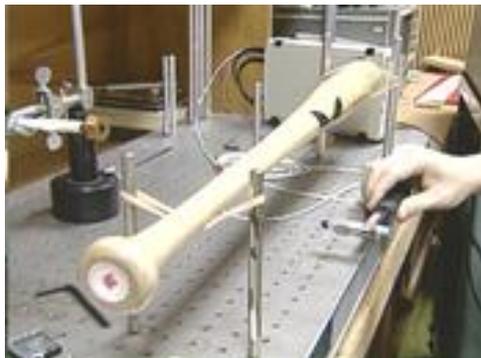
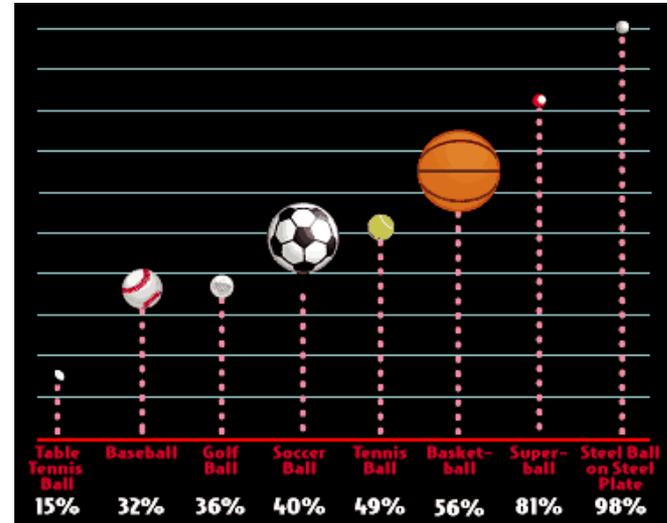
# Conservation of Energy



# Air Resistance (drag)

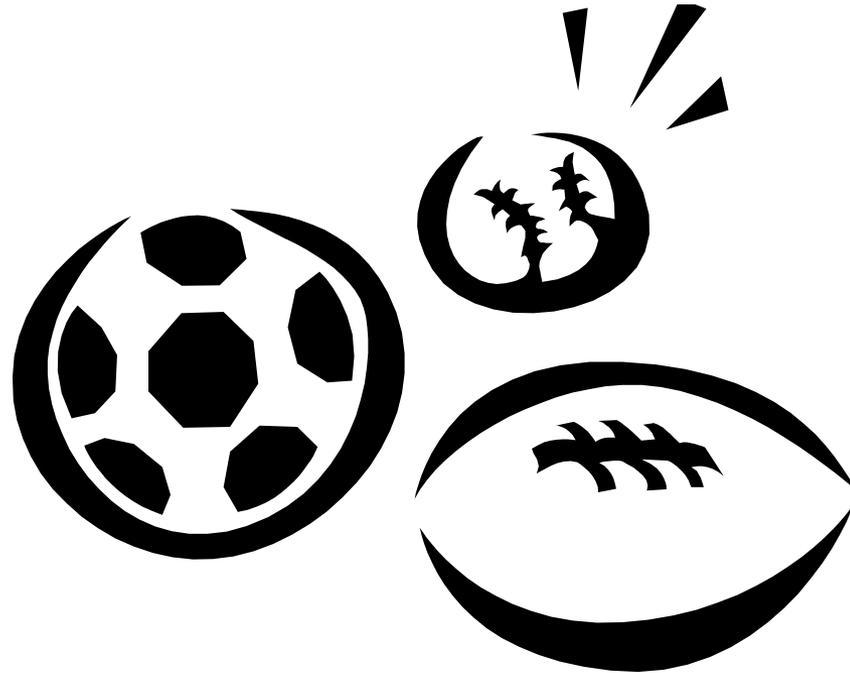


# Energy in Hitting a Baseball

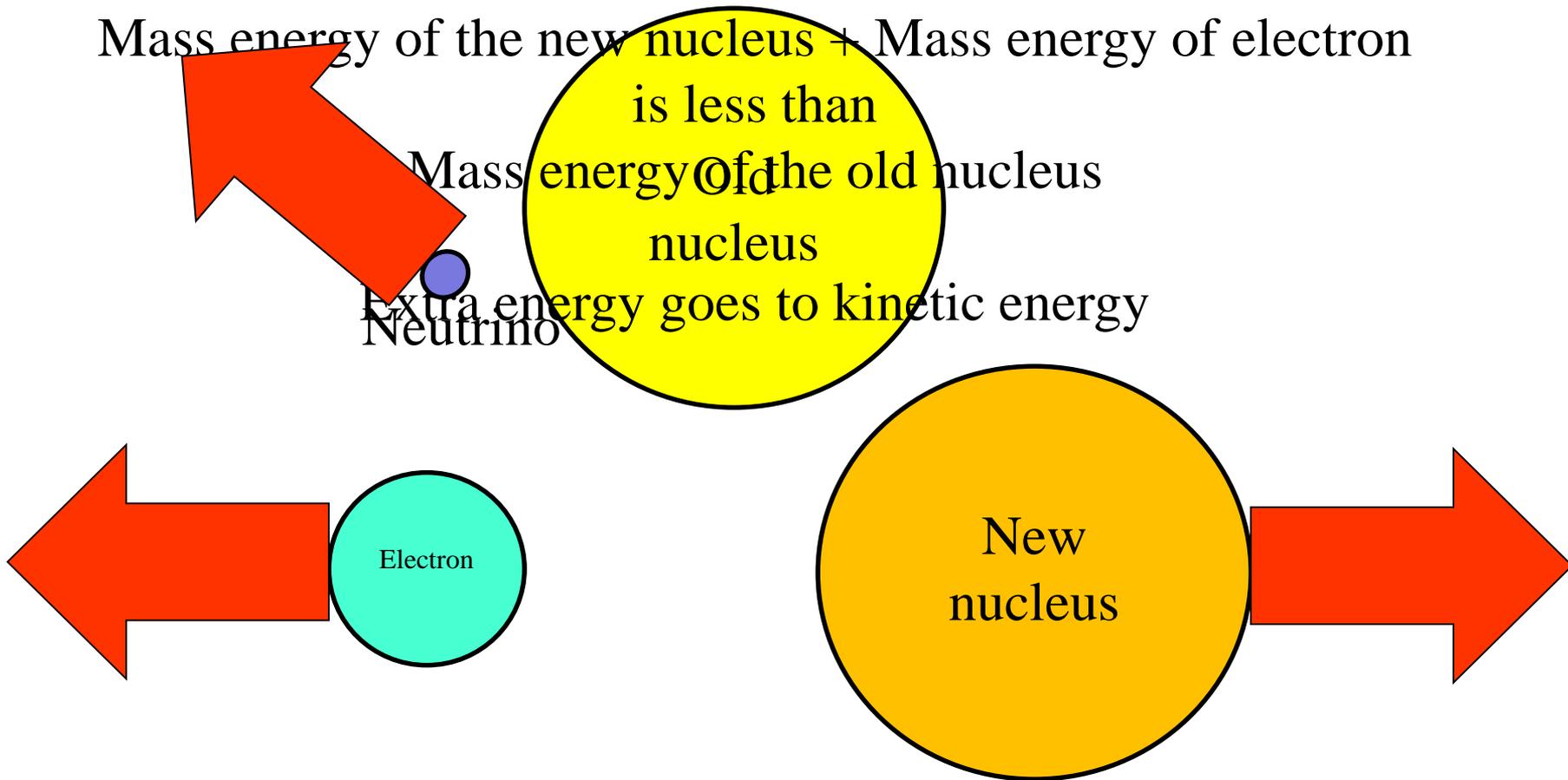


# Equipment features

- **Ball material, size, shape, and texture**
- **Properties of the club, bat, racquet, or stick**

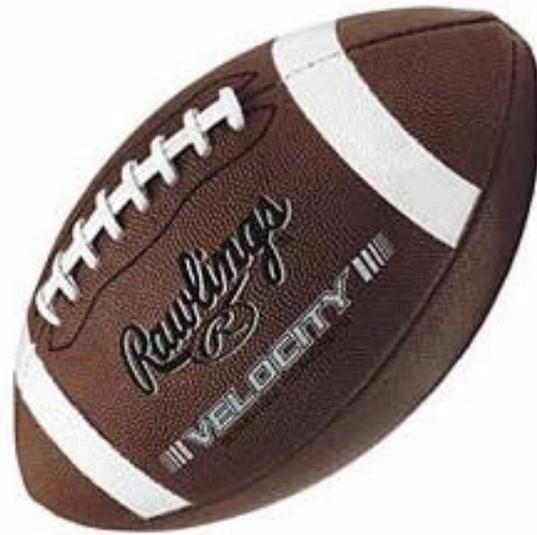


# Conservation of Energy in Particle Physics

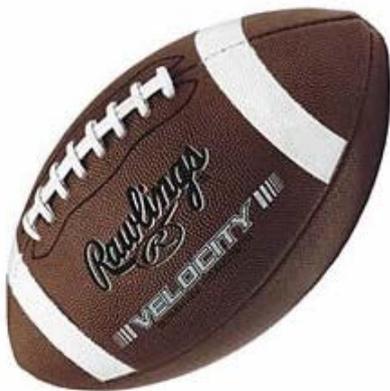
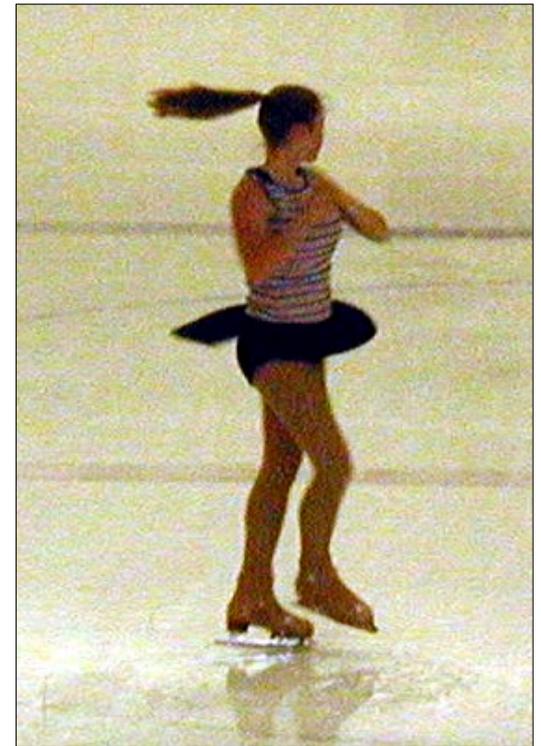




# The Power of Spin



# Spins in Figure Skating



# Snowboarding



<http://www.fondoscritoriogratis.net/snowboard>

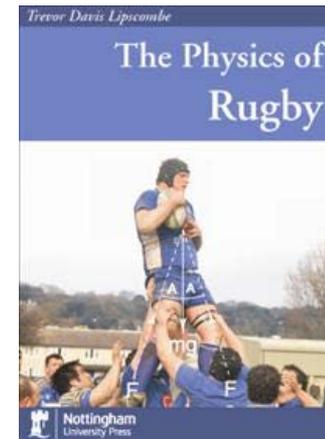
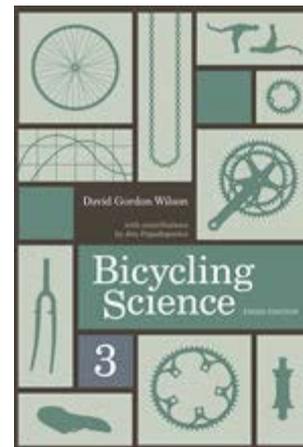
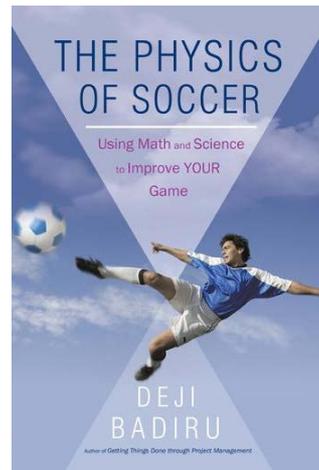
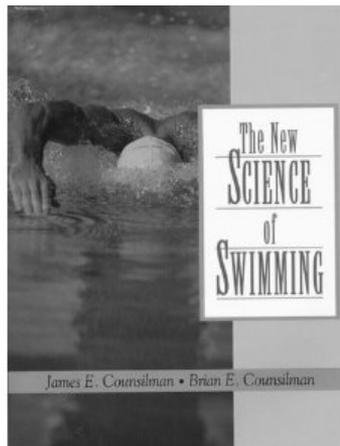
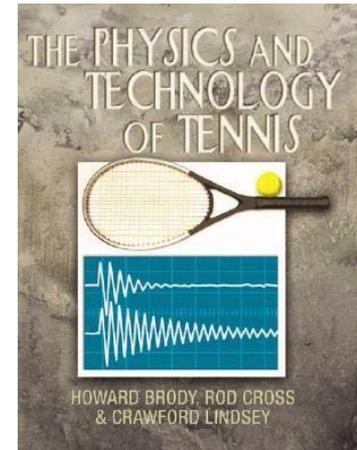
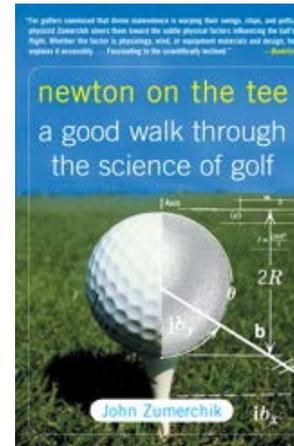
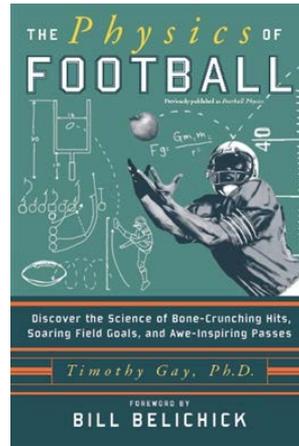
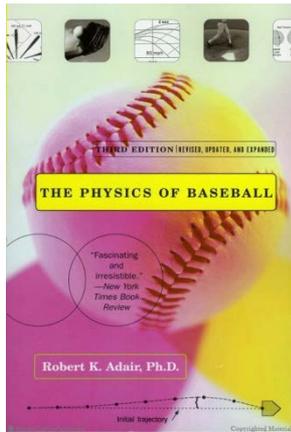
# Physical laws explain the world

- Newton's Laws of Motion
- Conservation of Energy
- Conservation of Momentum

These laws help us explain **everything**  
about sports.

**Physics really is everywhere!**

# Learn more about your favorite sport at the library



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