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# Physics IA proposal:

**Question:** "How does the spot on the racquet affect the height of the rebound?"

**Information I will base my study on:** On the face of the tennis racquet, there are several points that are important to players; these are the center of percussion, the vibration node, the best serving spot, the best returning spot and the dead spot. A couple of the spots are shown on the diagram below. The center of percussion is one of the two "sweet spots" of the racquet. This is because at the point of impact between the center of percussion and the ball, the hand can feel no impact. This is due to the fact that the center of percussion is located near the center of the face of the racquet. You can easily find out what all this means and about the other sweet spot. A good EEI would be to test the 'coefficient of restitution' (ratio of bounce height to drop height) of different parts of the face. Perhaps clamp the racquet in a vice and drop a tennis ball on different position of the face and noting bounce height as a fraction of drop height.

**Questions I can answer during the IA:** Does drop height affect the coefficient of restitution? Is the type of ball important? Does a temperature change shift the sweet spots? Are new racquets better than old? Is aluminum better than graphite? Does string tension play any part?

**Bibliography:** https://obelkobusnel.files.wordpress.com/2012/03/300-lab-ideas.pdf