

CSAAPT Spring 2022 Semi-Virtual Meeting



Chesapeake Section of the
American Association of Physics Teachers
Spring 2022 Semi-Virtual Meeting
April 2, 2022 @ **RADFORD** UNIVERSITY

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Type: **Talk**

Pulling a Spool

Saturday, April 2, 2022 10:15 AM (15 minutes)

A spool of ribbon is placed on a rough horizontal table. The ribbon is pulled so that it makes an angle relative to the table, where 0 degrees means the ribbon is unwinding from the bottom of the inner axle of the spool, 90 degrees corresponds to the ribbon being pulled straight up into the air, and 180 degrees implies the string is unwinding from the top of the inner axle. Suppose the spool is oriented so that the horizontal component of the pulling force is always rightward. Also assume the pulling force is sufficiently gentle that the spool rolls without slipping.

With that setup in mind, this talk will address two tricky questions:

- (1) Does the spool roll rightward or leftward?
- (2) Does the static friction force point rightward or leftward?

As a hint, I will tell you that there are up to four different relevant ranges of angles between 0 and 180 degrees. I will explain what those four ranges are and how the answers to these two questions depend on them.

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Session Classification: Morning Session 2