**附件一：本次校赛中英文赛题**

**2. Circling Magnets 旋转磁铁**

Button magnets with different diameters are attached to each end of a cylindrical battery. When placed on an aluminium foil the object starts to circle. Investigate how the motion depends on relevant parameters.

将直径不同的纽扣磁铁贴在圆柱形电池的两端。将其放置在铝箔上后，物体会开始旋转。探究相关参数如何影响该运动。

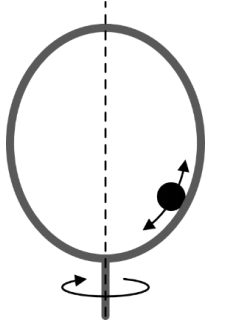
**3. Proximity Sensor 接近传感器**

A simple passive inductive sensor can detect ferromagnetic objects moving through its magnetic field. Construct such a passive sensor and investigate its characteristics such as sensing range.

一个简单的无源感应传感器可以探测到穿过它磁场的铁磁性物体。构建这样一个无源传感器并探究其特性，如感应范围。

**5. Synchronised Candles 同步蜡烛**

Oscillatory flames can be observed when several candles burn next to each other. Two such oscillators can couple with each other, resulting in in-phase or anti-phase synchronisation (depending on the distance between the sets of candles). Explain and investigate this phenomenon.

当几支彼此临近的蜡烛燃烧时，可以观察到振荡的火焰。两个这样的振荡可以相互耦合，导致同向或者反向同步（取决于蜡烛组之间的距离）。解释并研究这个现象。

**7. Bead Dynamics 珠子动力学**

A circular hoop rotates about a vertical diameter. A small bead is allowed to roll in a groove on the inside of the hoop. Investigate the relevant parameters affecting the dynamics of the bead.

一个环绕着垂直于直径的轴旋转，让一个小珠子可在环内的凹槽中滚动。研究相关参数对珠子动力学的影响。

**8. Fuses 保险丝**

A short length of wire can act as an electrical fuse. Determine how various parameters affect the time taken for the fuse to 'blow'.

一根短电线可以充当保险丝。试确定各参数是如何影响保险丝“熔断”所需时间的。

**9. Light Whiskers 光须**

When a laser beam enters a soap film at a small angle, a rapidly changing pattern of thin, branching light tracks may appear inside the film. Explain and investigate this phenomenon.

当一束激光以小角度照射肥皂膜时，薄膜内部可能出现由细的、分岔的光轨迹构成的快速变化的图案。解释并探究此现象。

**12. Wilberforce Pendulum 韦氏摆**

A Wilberforce pendulum consists of a mass hanging from a vertically oriented helical spring. The mass can both move up and down on the spring and rotate about its vertical axis. Investigate the behaviour of such a pendulum and how it depends on relevant parameters.

威尔伯福斯摆（韦氏摆）由悬挂在竖直方向的螺旋弹簧和连接在弹簧末端的物块组成。物块既能在弹簧上上下运动，又能绕其竖直轴旋转。研究这种摆的运动行为，以及它是如何依赖于相关参数的。

**15. Rebounding Capsule 反弹胶囊**

A spherical ball dropped onto a hard surface will never rebound to the release height, even if it has an initial spin. A capsule-shaped object (i.e. Tic Tac mint) on the other hand may exceed the initial height. Investigate this phenomenon.

落在坚硬表面的圆球即便具有一个初始的旋转速度，也永远不会反弹到释放的高度；胶囊状物体（如Tic Tac薄荷糖）却可能反弹超过初始高度。研究这个现象。

**16. Ultrasonic Pump 超声波泵**

A capillary immersed in an ultrasonic bath works like a pump that can lift water to a considerable height. Explain and investigate this phenomenon.

浸没在超声波浴中的毛细管会像水泵一样工作，将毛细管内的水提升到相当高的高度。解释和研究这一现象。

**17. Hand Helicopter 竹蜻蜓**

A simple hand helicopter can be made by attaching rotor blades to one end of a vertical stick. The helicopter moves upwards when the stick is twisted at a high enough speed and then let go. Investigate how the relevant parameters affect the lift-off and the maximum height.

一架简单的手提直升机可以通过将旋翼叶片固定在垂直杆的一端制作而成。当垂直杆以足够高的速度旋转时，松开手，手提直升机就会起飞。研究相关参数对起飞和飞行最大高度的影响。