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## 第四届西南地区大学生物理学术竞赛暨第十一届中国大学生物理学术竞赛西南赛区预选赛第一轮通知

各高校教务处：

中国大学生物理学术竞赛（CUPT）是中国借鉴国际青年物理学家锦标赛（IYPT）的模式创办的国内全国性赛事。该项活动得到了教育部的支持，是实践国家教育中长期发展规划纲要的重要大学生创新竞赛活动之一。CUPT 已经在全国连续举办了十届，以其独特的竞赛模式和理念吸引了越来越多的知名高校和物理精英参与，并已成为国内具有重要影响力的大学生物理竞技赛事之一。

基于 CUPT 活动对大学生的创新意识、创新能力、协作精神和实践能力方面具有独特的作用，在借鉴华东地区、西北地区和东北地区的大学生物理学术竞赛经验的基础上，由教育部高等学校物理学类专业教学指导委员会西南地区分委会、四川省物理学会、西南地区各高校一起倡导，在西南地区举办西南地区大学生物理学术竞赛（SWUPT）；以提升西南地区大学生的物理科研素养和创新意识，加强各高校大学生及教师之间的学术交流，为落实学校培养高素质本科生和创新人才培养注入新动力。由教育部高等学校物理学类专业教学指导委员会西南地区分委会主办，贵州大学承办的“第四届西南地区大学生物理学术竞赛”拟定于 2020 年 5 月底到 6 月初（具体时间详见第二轮通知）在贵州大学西校区举行，欢迎高校师生前来参加比赛或观摩交流。现将有关事项通知如下：

### 一、赛事要求

1. 每所参赛学校可派 1-2 支代表队和 1-2 名领队，每支代表队由 5 名学生选手组成，领队可由教师或学生担任。

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2. 每所观摩学校必须有领队带队，最多可派 8 人，观摩人员可以是老师或学生。
  3. 受比赛规则限制，报名参赛代表队必须参加比赛，不得临时退出。
  4. SWUPT 竞赛规则参照 IYPT 比赛规则，竞赛工作语言为中文。
  5. 第四届 SWUPT 试题采用第 33 届 IYPT 问题中的 12 道题(题号为:1、2、3、4、5、8、9、10、11、14、16、17)（详见附录）。
  6. 各参赛和观摩高校推荐裁判要求：

参赛高校：若派 1 支参赛代表队，请至少推荐 2 名裁判；若派 2 支参赛代表队，请至少推荐 3 名裁判。观摩高校：请推荐 1 名裁判。（请裁判务必提前熟悉比赛题目和相关研究内容。）

## 二、赛事安排

1. 报名方式与时间：请拟参赛高校将报名回执（如人员未定，可只发领队信息），于 2019 年 12 月 20 日前发至竞赛邮箱：  
[wlsy\\_2019@163.com](mailto:wlsy_2019@163.com)（注意：邮箱中间有下划线连接）。
2. 欢迎加入西南地区 CUPT 微信群（由于现有人数较多，需要邀请入群，若无认识的老师邀请，可以联系白光富老师协助加入）。
3. 报名费：教师领队和裁判 900 元/人，参赛学生和学生领队 800 元/人，观摩师生 700 元/人。
4. 会议期间食宿统一安排，费用自理。

## 三、联系方式

1. 通讯地址：贵阳市花溪区贵州大学东校区（原北校区）。  
邮 编： 550025
2. 联系人：  
白光富，手机： 13985548050

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邮箱: [baiguangfu123@163.com](mailto:baiguangfu123@163.com)

魏晓楠, 手机: 13639086231

邮箱: [756339704@qq.com](mailto:756339704@qq.com)

有关第四届 SWUPT 筹备情况及相关信息我们将在微信群里及时公布, 欢迎各位老师和学生在微信群里提出建议和指导。

教育部高等学校物理学类专业教学指导委员会西南地区分委会

贵州省物理学会

贵州大学物理学院 (代章)

2019/10/23

回执:

学校	预计可以参赛队伍数量	比赛事宜对接老师联系方式
		Email: 手机号: 通信地址:

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## Problems for the 33rd IYPT 2020

### 1. Invent Yourself

Design an instrument for measuring current using its heating effect. What are the accuracy, precision, and limits of the method?

### 2. Inconspicuous Bottle

Put a lit candle behind a bottle. If you blow on the bottle from the opposite side, the candle may go out, as if the bottle was not there at all. Explain the phenomenon.

### 3. Swinging Sound Tube

A Sound Tube is a toy, consisting of a corrugated plastic tube, that you can spin around to produce sounds. Study the characteristics of the sounds produced by such toys, and how they are affected by the relevant parameters.

### 4. Singing Ferrite

Insert a ferrite rod into a coil fed from a signal generator. At some frequencies, the rod begins to produce a sound. Investigate the phenomenon.

### 5. Sweet Mirage

Fata Morgana is the name given to a particular form of mirage. A similar effect can be produced by shining a laser through a fluid with a refractive index gradient. Investigate the phenomenon.

### 6. Saxon Bowl

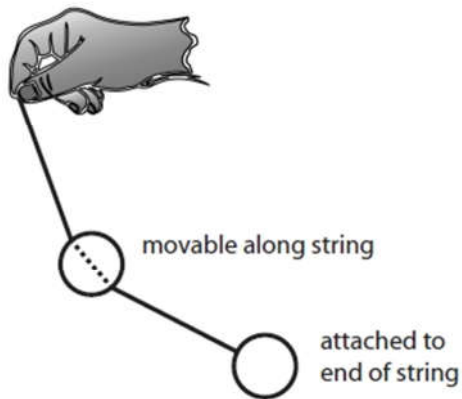
A bowl with a hole in its base will sink when placed in water. The Saxons used this device for timing purposes. Investigate the parameters that determine the time of sinking.

### 7. Balls on a String

Put a string through a ball with a hole in it such that the ball can move freely along the string. Attach another ball to one end of the string. When you move the free

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end periodically, you can observe complex movements of the two balls. Investigate the phenomenon.



### **8. Soap Membrane Filter**

A heavy particle may fall through a horizontal soap film without rupturing it. However, a light particle may not penetrate the film and may remain on its surface. Investigate the properties of such a membrane filter.

### **9. Magnetic Levitation**

Under certain circumstances, the “flea” of a magnetic stirrer can rise up and levitate stably in a viscous fluid during stirring. Investigate the origins of the dynamic stabilization of the “flea” and how it depends on the relevant parameters.

### **10. Conducting Lines**

A line drawn with a pencil on paper can be electrically conducting. Investigate the characteristics of the conducting line.

### **11. Drifting Speckles**

Shine a laser beam onto a dark surface. A granular pattern can be seen inside the spot. When the pattern is observed by a camera or the eye, that is moving slowly, the pattern seems to drift relative to the surface. Explain the phenomenon and investigate how the drift depends on relevant parameters.

### **12. Polygon Vortex**

A stationary cylindrical vessel containing a rotating plate near the bottom surface is partially filled with liquid. Under certain conditions, the shape of the liquid

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surface becomes polygon-like. Explain this phenomenon and investigate the dependence on the relevant parameters.

### **13.Friction Oscillator**

A massive object is placed onto two identical parallel horizontal cylinders. The two cylinders each rotate with the same angular velocity, but in opposite directions. Investigate how the motion of the object on the cylinders depends on the relevant parameters.

### **14.Falling Tower**

Identical discs are stacked one on top of another to form a freestanding tower. The bottom disc can be removed by applying a sudden horizontal force such that the rest of the tower will drop down onto the surface and the tower remains standing. Investigate the phenomenon and determine the conditions that allow the tower to remain standing.

### **15.Pepper Pot**

If you take a salt or pepper pot and just shake it, the contents will pour out relatively slowly. However, if an object is rubbed along the bottom of the pot, then the rate of pouring can increase dramatically. Explain this phenomenon and investigate how the rate depends on the relevant parameters.

### **16.Nitinol Engine**

Place a nitinol wire loop around two pulleys with their axes located at some distance from each other. If one of the pulleys is immersed into hot water, the wire tends to straighten, causing a rotation of the pulleys. Investigate the properties of such an engine.

### **17.Playing Card**

A standard playing card can travel a very long distance provided that spin is imparted as it is thrown. Investigate the parameters that affect the distance and the trajectory.

第 33 届 IYPT 问题可参看 IYPT 官网:

<https://iypt.org/index.php/problems/problems-for-the-33rd-iypt-2020/>