

## 2020 年 CUPT 中南赛区竞赛第一轮通知

中南地区各高校教务处:

根据“中国大学生物理学术竞赛规则讨论纪要（2017 年 9 月 22 日）”精神，从 2018 年起，CUPT 比赛拟分为区域赛和全国赛两个阶段进行。区域赛分为东北、华北、华东、中南、西南、西北六个赛区，划分范围参照教育部教学指导委员会的规定制定。

第三届 CUPT 中南赛区比赛将于 2020 年 5 月 22 日至 24 日在中山大学举办，欢迎中南地区各高校师生前来参加比赛或观摩交流。有关事项通知如下：

### 一、 赛事要求

- 1、 每个参赛高校派一支代表队。每支代表队由 5 名参赛选手和 1-2 名领队组成，领队可以由教师或学生担任。
- 2、 报名团队必须参加比赛，不得临时退出比赛，恶意退赛报 CUPT 国赛组委会备案。
- 3、 2020 年 CUPT 中南赛区题目为当年 CUPT 竞赛题目。
- 4、 2020 年 CUPT 中南赛区比赛规则参照 CUPT 全国赛比赛规则。
- 5、 各参赛高校推荐 2 名教师担任竞赛裁判，担任裁判的教师需公正公平，参加过 CUPT 竞赛评审或观摩过 CUPT 竞赛。
- 6、 参赛学校自带笔记本电脑、投影仪连接线（建议带延长线）。主办方将提供支持 VGA 接口和 HDMI 接口的投影仪。

### 二、 赛事安排

- 1、 报名方式与时间：请拟参赛高校将报名回执（见附件 3）电子版于 2020

年 2 月 29 日前 Email 发给黄臻成老师 ([hzhench2@mail.sysu.edu.cn](mailto:hzhench2@mail.sysu.edu.cn), [13695422@qq.com](mailto:13695422@qq.com))。注：本轮报名用于统计人数，裁判和队员最终名单可在第二轮通知后确认。

- 2、 注册费：领队教师、裁判、比赛队员、观摩师生均为 800 元/人。
- 3、 会议期间食宿统一安排，费用自理。

### 三、 联系方式

- 1、 通讯地址：广州市海珠区新港西路 135 号大院中山大学西北区 565 栋陆佑堂 103
- 2、 联系人：  
黄臻成，电话：13631307010，邮箱：[hzhench2@mail.sysu.edu.cn](mailto:hzhench2@mail.sysu.edu.cn)；  
宁云松，电话：15725546596，邮箱：[ningys@mail2.sysu.edu.cn](mailto:ningys@mail2.sysu.edu.cn)

附件 1：CUPT2020 中南赛区规则补充条款

附件 2：CUPT2020 竞赛题目原题

附件 3：2020 年 CUPT 中南赛区回执

中国大学生物理学术竞赛(中南赛区)委员会  
广东省物理学会(代章)

中山大学物理学院  
2020 年 1 月 8 日



## 附件 1：CUPT2020 中南赛区规则补充条款

- 1、 竞赛题目为当年 CUPT 竞赛题目（见附件 2）中的 12 题，地区赛拒题规则参照国赛，前 3 题不扣系数，超过 3 题后按国赛规则执行。
- 2、 经竞赛委员会商讨决议，本年度中南赛区采用题目为第 2, 4, 3, 6, 7, 8, 10, 11, 12, 13, 14, 17 题（参见附件 2 高亮题）。
- 3、 竞赛进行三轮，最终成绩按照总分排名。地区赛安排如下：  
5 月 22 日报到，晚上抽签；  
5 月 23 日上午第一轮，下午第二轮；  
5 月 24 日上午第三轮、下午成绩公布与闭幕式。
- 4、 报名参赛队伍随机抽签决定分组和比赛顺序。
- 5、 各校选派 2 名具有竞赛裁判经验的教师参加地区赛裁判工作，有适当的裁判费补贴。另外，还将邀请其他赛区老师来当裁判
- 6、 参赛学校需交注册费，用于裁判费、工作人员或学生助理劳务费、场地水、茶点等费用。
- 7、 CUPT2020 中南赛区竞赛由广东省物理学会组织，竞赛证书盖章由广东省物理学会盖章。
- 8、 中南赛区裁判委员会负责赛事的裁判组织与评判工作。
- 9、 CUPT2020 中南赛区竞赛各个档次获奖暂定为：一等奖 20%（向上取整），二等奖 30%（向上取整），其余为三等奖。
- 10、 对辱骂裁判、辱骂学生、行为不端等违规行为进行处罚，处罚分为黄牌警告和红牌警告（两次黄牌即为红牌），红牌警告者取消竞赛成绩。

## 附件 2：CUPT 竞赛题目原题

### Problems for the 33<sup>rd</sup> IYPT 2020

Released by the IOC on July 14<sup>th</sup>, 2019

#### 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

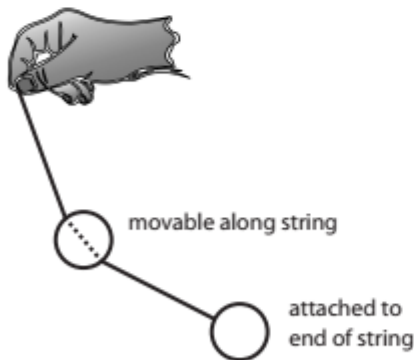
Fata Morgana is the name given to a particular form of mirage. A similar effect can be produced by shining a laser through a fluid with a refractive index gradient. Investigate the phenomenon.

#### 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 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.

**Authors:** Cheong-Eung Ahn, Alan Allinson, John Balcombe, Samuel Byland, Nikita Chemikov, Nicolas Chevalier, Sandu Golcea, Kent Hogan, Yung-Yuan Hsu, Gerard Jennings, Jakob Lavröd, Heorhi Liasneuski, Zakhar Maizelis, Ilya Martchenko, Florian Ostermaier, Peter Poier, Oksana Pshenichko, Julian Ronacher, Andrey Shchetnikov, Chik Cheng Yao

**Problem selection committee:** John Balcombe, Samuel Byland, Ilya Martchenko

#### 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 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.

	Signatory	Timotheus Johannes Bell
	Date/Time-UTC	2019-07-16T12:51:15+02:00
	Verification	Information about the verification of the electronic signature can be found at: <a href="https://www.signaturprofung.gv.at">https://www.signaturprofung.gv.at</a>
Note	This document is signed with a qualified electronic signature. According to Art. 25 para. 2 of the Regulation (EU) No 910/2014 of 23. July 2014 ("eIDAS-Regulation") it shall have the equivalent legal effect of a handwritten signature.	

### 附件 3：2020 年 CUPT 中南赛区回执

学校名称					
类别	姓名	性别	职称	手机	邮箱
联系人					
领队					
裁判					
参赛学生					
观摩教师					
观摩学生					
竞赛委员会委员 <small>(请在竞委会名单中的高校填写)</small>					
总人数					
<b>开发票信息（请务必填写准确以下信息）</b>					
开发票抬头名称					
组织机构代码					

注：表格不够，请自行添加。

学校院系名称（盖章）：

领队签字：

2020 年 月 日