



**5th Hel.A.S Summer School  
“MHD in Astrophysics”  
16-20 September 2024**

**Department of Physics, University of Ioannina**  
<https://helas.gr/school/2024/>

**Programme**

**Day-1 Monday 16-09-2024**

**8:40-9:00** Welcome

**9:00-10:15** *The Universe is Made of Plasma and Magnetic Field*, Costas Alissandrakis

**10:15-11:30** *MHD in Astrophysics: Introduction and highlights*, Kanaris Tsiganos

**11:30-12:00** Coffee Break

**12:00-13:00** *MHD with Physics Informed Neural Networks (PINNs)*, Ioannis Contopoulos

**13:00-14:30** Lunch Break

**14:30-17:30 Practical Work Session 1:** *Solution of a Simple Physics Problem with Physics Informed Neural Networks (PINNs)*, Ioannis Dimitropoulos, Ioannis Contopoulos

**Day-2 Tuesday 17-09-2024**

**9:00-10:00** *MHD Instabilities*, Nektarios Vlahakis

**10:00-11:00** *MHD in extreme Astrophysical Environments*, Konstantinos Gourgouliatos

**11:00-11:30** Coffee Break

**11:30-12:30** *MHD Turbulence and Particle Energisation*, Loukas Vlahos

**12:30-13:00** Discussion

**13:00-14:30** Lunch Break

**14:30-17:30 Practical Work Session 2:** *Problem Solving in MHD*, Alexander Nindos, Nektarios Vlahakis

### **Day-3 Wednesday 18-09-2024**

**9:00-10:00** *MHD, Solar and Stellar Activity*, Vasilis Archontis

**10:00-11:00** *Magnetic Helicity: Applications in Solar Physics*, Alexander Nindos

**11:00-11:30** Coffee Break

**11:30-12:30** *Theory and Applications of Magnetic Field-Line Helicity in Solar Physics*, Kostas Moraitis

**12:30-13:30** *MHD as the Backbone for Space Weather Prediction*, Anastasios Anastasiadis

**13:30-15:00** Lunch Break

**15:00-18:00 Practical Work Session 3:** *Numerical Methods for MHD -Force-free equilibria via relaxation methods.-Time-dependent problems: upwind schemes - flux limiters*, Konstantinos Gourgouliatos

### **Day-4 Thursday 19-09-2024**

**9:00-10:00** *MHD of the Interstellar Medium*, Kostas Tassis

**10:00-11:00** *Heating of Solar and Stellar Coronae*, Juxhin Zhuleku

**11:00-11:30** Coffee Break

**11:30-12:30** *MHD of Laboratory Plasmas: Crossovers with Astrophysics*, Georgios Throumoulopoulos

**12:30-13:00** Discussion

**13:00-14:30** Lunch Break

**14:30-17:30 Practical Work Session 4:** *Visualization and Analysis of MHD simulation output*, Kostas Moraitis, Juxhin Zhuleku, V. Agalianou, A. Giannis

### **Day-5 Friday 20-09-2024**

**09:00-13:00** Student presentations

**13:00-13:10** Concluding remarks