



Our Star the Sun

General description and guidelines

Introduction

The aim of this general description is to present the set of activities that fulfil the package “Our Star the Sun”, in order to have the idea about how these activities are set together under a general framework. In addition, the main pedagogical guidelines common for these tasks will be presented.

“Our Star the Sun” is the first collection of tasks that will be complemented with “the Sun-Earth interaction”. This first collection of tasks focusses on understanding the Sun as a star. Through completing the tasks, the students will acquire progressive knowledge about the Sun, starting from a simple description of how it looks like, the information that can be extracted from this simple description, and going further with the knowledge until the understanding of how it is possible to infer information about the Solar deeper inner structure by understanding how it vibrates.

All the tasks will follow the same didactical principles. They will be driven by the teacher through presentations provided. These presentations will be given using **inquire-active** learning strategies. The teachers will make several questions on the way and provide time to **reflect** through the presentations. **IGP methodologies** will be used to complete individual, group and/or plenum reflections. Each presentation has slides showing the title “Implementation” and written notes in notes section. The objective is to orientate the teacher and help implementing these didactical strategies.

The next page provides an overview of the different activities and how are they related between them. Some of the tasks will need to complement previous sections but others are independent.

About the individual activities:

From page number 3, detailed information for each activity can be found, including the outline of the resource, fast facts, and what the students will learn about.

Each activity is fulfilled using a power point presentation where the teacher follows the “Implementation” guidelines and the text written in the notes

Activity

Main learning outcomes

Activity I: naked eye



Activity II: energy bill



Activity III: oscillations



Activity IV: solar and stellar oscillations

How to build a physical model of the sun

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Sources of energy in the sun

The vibrational properties of physical bodies are related to their internal structure and dynamics

The sun and other stars vibrate/oscillate

To measure solar and stellar oscillations

To extract information on the solar internal structure from its oscillatory properties

To learn how to move from the time-domain to the frequency-domain



Activity 1: The naked eye

Outline of the resource

This activity is intended to explain the basics of the scientific method, by observing a simple picture of the sun. Observation, questioning and building hypothesis are the first steps of the scientific method. Rather than the technology associated to observing, this activity stresses out the ability to look for patterns in nature and to make good questions and good initial guesses.

Based on very simple observations, a conceptual model about the structure of the sun will be built, highlighting the importance of language and maths in science.

Fast facts

Age range: Primary and Secondary

Type of module: Classroom activity

General Curriculum links: All areas of science

Complexity: Low-Medium

Time required: 1 class session

Location: Classroom

Includes the use of: Computer

Methodology: Direct instruction with active IGP questions/reflection

Students will learn

The basics of the scientific method

To look for patterns in nature

How a physical model is built

Use concepts like: plasma, gravity, pressure, temperature, ...

Activity:

Please, use the presentation "**O1 act1 the naked eye.pptx**" and follow the indications written in the notes.



Activity 2: Energy bill

Outline of the resource

This activity is intended to explain the basics of the scientific method, in particular the connection between hypothesis, experimentation, refutation and/or confirmation. The generation of energy within the sun is explained in terms of different physical mechanisms (hypothesis) and the corresponding results are analysed and compared with independent observations.

Fast facts

Age range: Secondary

Type of module: Classroom and outdoor activity

General Curriculum links: All areas of science

Complexity: Medium

Time required: 1-3 class sessions

Location: Classroom and outdoor

Includes the use of: Computer and smartphone

Methodology: Direct instruction with active IGP questions/reflection, hands-on

Students will learn

The basics of the scientific method

To look for patterns in nature

How a physical model is built

Use concepts like: energy, plasma, gravity, pressure, temperature, atoms...

Activity:

Please, use the presentation "**O1 act2 Energy bill.ppt**" and follow the indications written in the notes.



Activity 3: Energy bill – Task

Outline of the resource

This activity follows the previous one (act 2). It is intended to explain the basics of the scientific method: the connection between hypothesis, experimentation, refutation and/or confirmation. The generation of energy within the sun is explained in terms of different physical mechanisms (hypothesis) and the corresponding results are analysed and compared with independent observations.

In this task the students will calculate the solar luminosity with a smartphone.

Fast facts

Age range: Secondary

Type of module: Classroom and outdoor activity

General Curriculum links: All areas of science

Complexity: Medium

Time required: 1-3 class sessions

Location: outdoor

Includes the use of: Computer, smartphone with app "Google Science Journal"

Methodology: Hands-on

Students will learn

To use the light sensor of a smartphone to measure solar irradiance

To carry out measurements in all sites of the project (the Canaries, Norway and Denmark) to study variations of solar irradiance with latitude.

To carry out measurements at different dates and times to study seasonal variations of solar irradiance

To translate solar irradiance into solar luminosity

Activity:

Please, use the presentation "**O1 act3 Energy bill Task-smarthphone.pptx**" and follow the indications written in the notes.



Activity 4: Oscillations

Outline of the resource

This set of activities are intended to explain the connection between the vibrational patterns of an object and its internal structure and dynamics.

Fast facts

Age range: Secondary

Type of module: Classroom activity

General Curriculum links: All areas of science

Complexity: Medium

Time required: 3-4 class session

Location: Classroom

Includes the use of: Computer

Methodology: Direct instruction with active IGP questions/reflection; hands-on

Students will learn

The basics of the scientific method

To look for patterns in nature

How a physical model is built

Use concepts like: oscillations, frequency, resonance

Resources

Computer and projector

Smartphone with Audacity app or Google Journal app

Wooden stick, screws, string, masses, protractor, pvc tubes, rulers

Activity:

Please, use the presentation "**O1 act 4 Oscillations.ppt**" and follow the indications written in the notes.



Activity 5: Solar Stellar Oscillations

Outline of the resource

This set of activities are intended to explain the connection between the vibrational patterns of the sun and other stars and its internal structure and dynamics.

Fast facts

Age range: Secondary

Type of module: Classroom activity

General Curriculum links: All areas of science

Complexity: Medium

Time required: 3-4 class session

Location: Teide Observatory

Includes the use of: Computer

Methodology: Direct instruction and hands-on

Students will learn

The basics of the scientific method

To look for patterns in nature

How a physical model is built

Use concepts like: oscillations, frequency, resonance

Resources

Computer and projector

Software to present slides (ppt or similar)

Software: Audacity, Past3

Activity:

Please, use the presentation "**O1 act 5 Solar Stellar Oscillations.pptx**" and follow the indications written in the notes.