BUSTA 1

The candidate shall ***choose one of the topics*** *listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

Depending on their professional background, the candidate shall ***develop a discussion on the chosen topic.***

Question:

1) Choose a current or future observational facility and discuss how it can be exploited for strong gravitational lensing applications.

ESTRATTA

BUSTA 2

The candidate shall ***choose one of the topics*** *listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

Depending on their professional background, the candidate shall ***develop a discussion on the chosen topic.***

Question:

2) Discuss one aspect related to strong gravitational lensing that you consider particularly important for future astrophysical or cosmological studies.

ESTRATTA

BUSTA 3

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

3) Discuss one computational or methodological aspect that you consider particularly important for exploiting large astronomical datasets.

ESTRATTA

BUSTA 4

The candidate shall ***choose one of the topics*** *listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

Depending on their professional background, the candidate shall ***develop a discussion on the chosen topic.***

Question:

4) Discuss a possible role of strong gravitational lensing in addressing a currently open question in astrophysics or cosmology.

ESTRATTA

BUSTA 5

The candidate shall ***choose one of the topics*** *listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

Depending on their professional background, the candidate shall ***develop a discussion on the chosen topic.***

Question:

5) Discuss possible scientific opportunities opened by time-domain astronomy.

NON ESTRATTA

BUSTA 6

The candidate shall ***choose one of the topics*** *listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

Depending on their professional background, the candidate shall ***develop a discussion on the chosen topic.***

Question:

6) Discuss one observational or methodological approach that may contribute to our understanding of the Hubble tension.

NON ESTRATTA

BUSTA 7

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

7) Discuss one observational or computational aspect that could be essential for exploiting strong gravitational lensing for cosmological applications.

ESTRATTA

BUSTA 8

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

8) Discuss one scientific application of quasar variability that you consider particularly significant.

ESTRATTA

BUSTA 9

The candidate shall ***choose one of the topics*** *listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

Depending on their professional background, the candidate shall ***develop a discussion on the chosen topic.***

Question:

9) Discuss how light curves can be used to investigate astrophysical or cosmological phenomena.

NON ESTRATTA

BUSTA 10

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

10) Discuss the scientific potential of long-term monitoring of variable astronomical sources.

ESTRATTA

BUSTA 15

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

15) Discuss one aspect that you consider particularly important for improving future measurements of the Hubble parameter, which can help better understand the "Hubble tension".

NON ESTRATTA

BUSTA 14

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

14) Discuss one observational or computational challenge associated with irregularly sampled astronomical time series.

NON ESTRATTA

BUSTA 13

The candidate shall ***choose one of the topics*** *listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

Depending on their professional background, the candidate shall ***develop a discussion on the chosen topic.***

Question:

13) Discuss a method for finding new strong gravitational lenses in time-domain surveys.

ESTRATTA

BUSTA 12

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

12) Discuss an aspect (observational or computational) that you consider particularly relevant for future measurements of the Hubble parameter.

NON ESTRATTA

BUSTA 11

*The candidate shall **choose one of the topics** listed in the "Prova d'esame" (Allegato 1), namely:*

a) Hubble parameter and "Hubble tension";
b) Strong gravitational lensing;
c) Quasars' variability and light curves in the optical band in general;
d) Big data and computational approaches.

*Depending on their professional background, the candidate shall **develop a discussion on the chosen topic.***

Question:

11) Discuss the opportunities offered by large samples of variable astronomical sources.

ESTRATTA