

Introduction to Astronomy

Summary Questions Week 14

20 January 2020

1. What is a longitude-velocity diagram and what can it be used for?

Solution:

A so-called l-v diagram plots the *intensity of spectral line radiation against the Galactic longitude of the observation and the radial velocity* of the gas (measured through the Doppler shift of the spectral line).

The tangent points of l-v diagrams can be used to *measure the Galactic rotation curve* and the overall diagram can be used to *identify and locate spiral arms* in the Galaxy.

2. What are spiral arms really, and how does this relate to star formation?

Solution:

Spiral arms are *density waves*. This means the matter and the arms are not continuously connected, but the matter actually moves *through* the spireal arms.

This is related to star formation because *in order to achieve star formation, interstellar gas needs to be compressed sufficiently to allow the formation of molecules. Such a compression takes place when the gas enters a spiral arm*. This is why star formation is mostly seen on the inside edge of spiral arms.

3. What is the stellar luminosity function and what does it tell us in the case of the Milky Way?

Solution:

The luminosity function is the *histogram of the luminosities of stars* in the Galaxy. It can be used to *study the star formation history and the stellar populations present in the Galaxy*. Specifically, in the case of the Milky Way it tells us that star formation occurs quite uniformly throughout the observable luminosity range, though the most massive stars are somewhat less common.