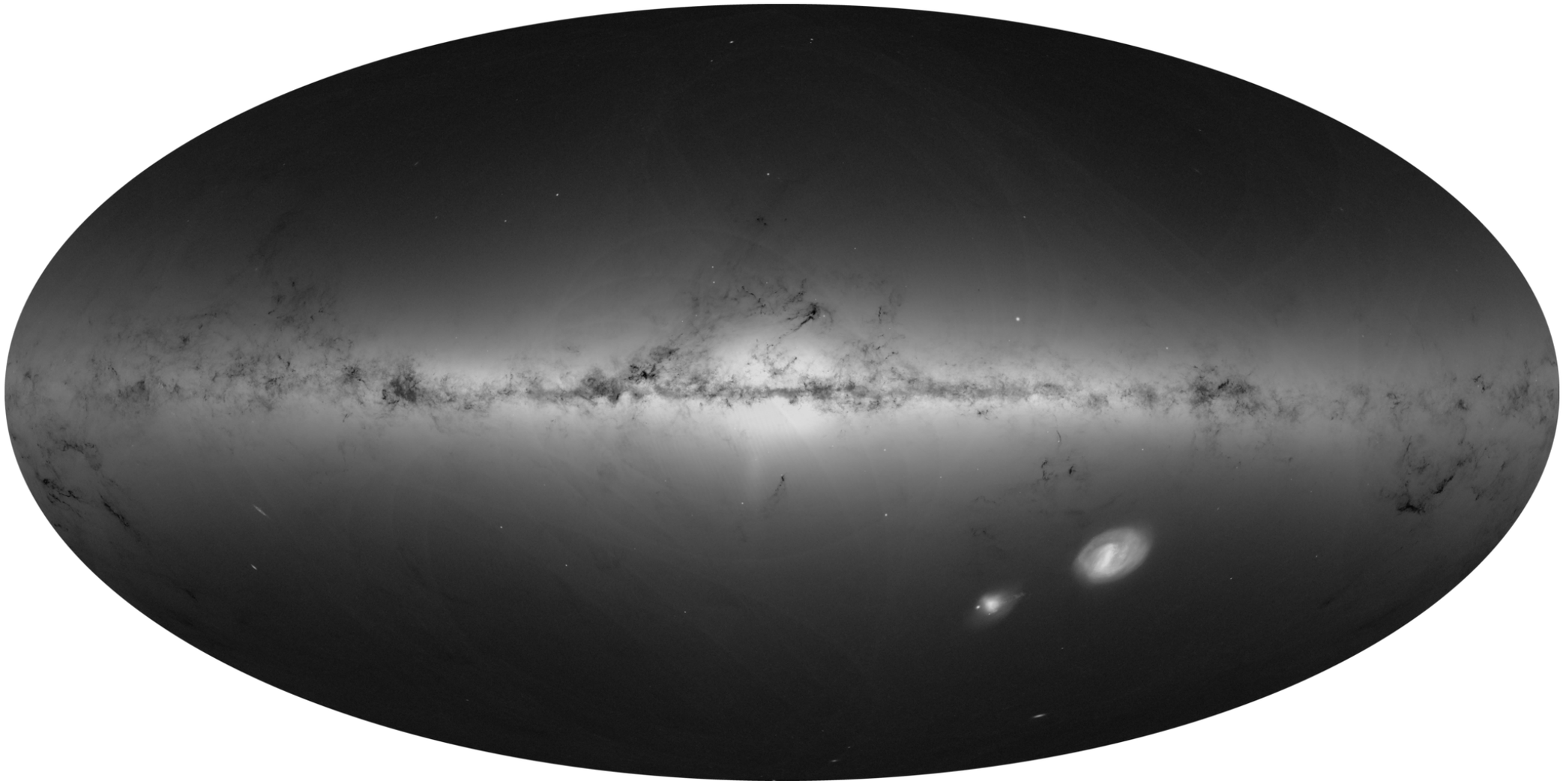


Anomalies in Galactic Motion

GAIA ASTRIUM'S GAIA SATELLITE - BUILT TO MAP THE MILKY WAY

50 EUROPEAN COMPANIES

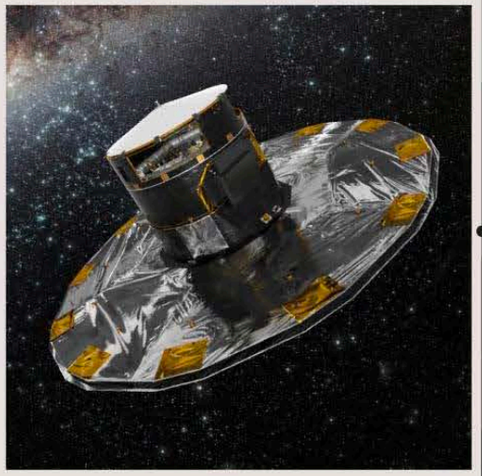
400 ENGINEERS

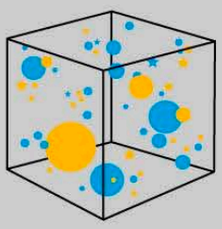
15 PROJECT INVOLVING 15 EUROPEAN SPACE AGENCY MEMBER COUNTRIES

3 YEARS OF TESTING AND INTEGRATION

Dec 13 LAUNCH SCHEDULED FOR DECEMBER 2013

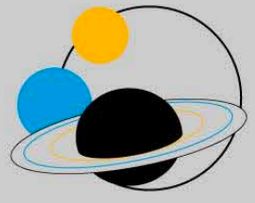
5 5 YEARS NOMINAL LIFE IN ORBIT





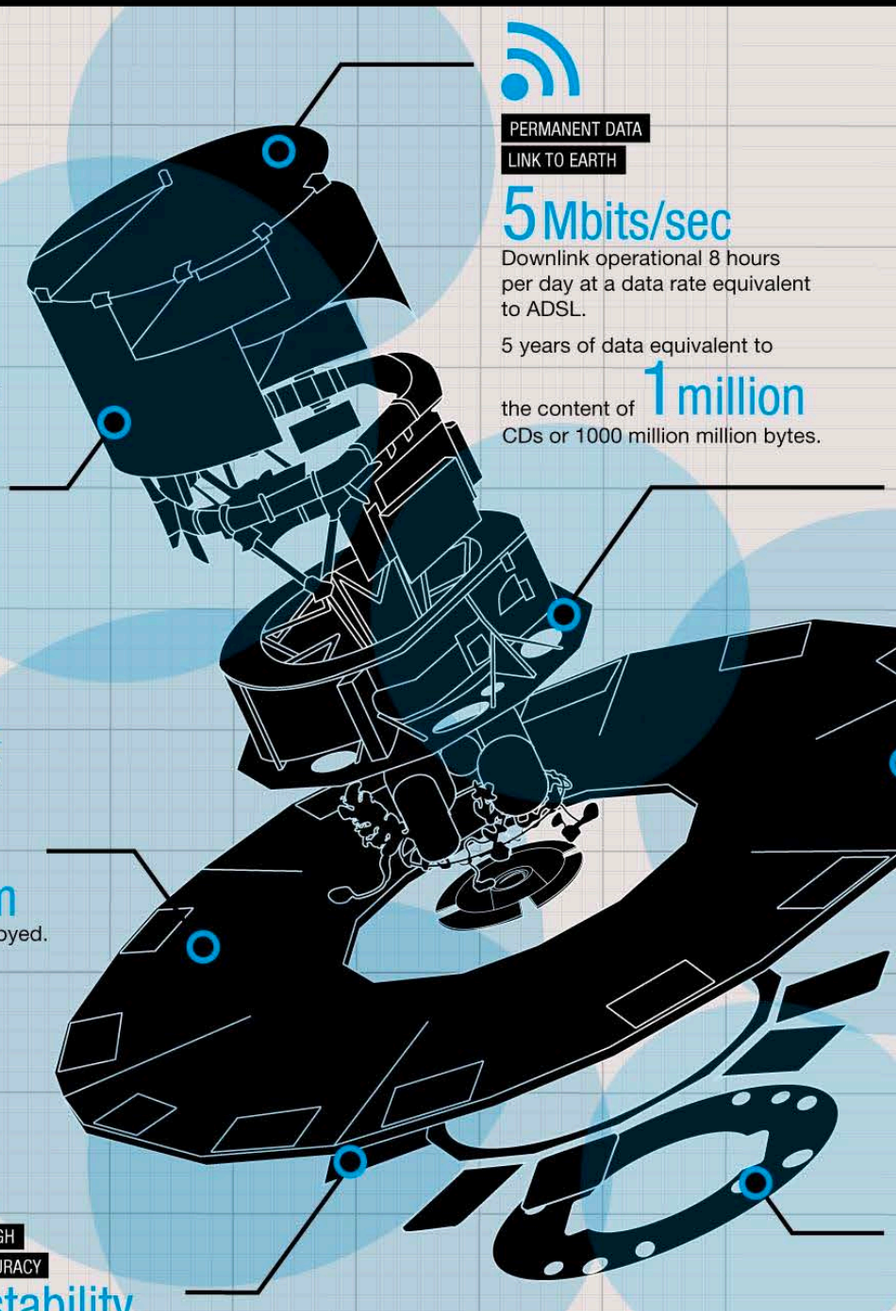
3D IMAGES OF A BILLION STARS

Each star will be detected and measured 70 times during the mission.
Gaia will determine their position, velocity, distance from Earth, colour and luminosity.



DISCOVERY OF 2,000 NEW PLANETS

Their detection will enable us to improve our knowledge of the mechanisms at work in planetary systems.



ADVANCED PAYLOAD TECHNOLOGY

DUAL TELESCOPE CONCEPT IN A SINGLE INTEGRATED INSTRUMENT COMPRISING

10 mirrors
1 astrometry function
1 photometry function
1 spectrometry function

PERMANENT DATA LINK TO EARTH

5 Mbits/sec

Downlink operational 8 hours per day at a data rate equivalent to ADSL.

5 years of data equivalent to the content of **1 million** CDs or 1000 million million bytes.

THE LARGEST INSTRUMENT EVER BUILT USING CERAMICS

Structure made of **silicon carbide,** a material in which Astrium possesses unique expertise.

OPTIMISED FOR STABILITY, DURABILITY AND LOW MASS

A UNIQUE SPACECRAFT

HEIGHT **3m**

DIAMETER **10m** with sunshield deployed.

THERMAL INSULATION resistant to temperatures **BETWEEN**

-170°C +70°C

EXTREMELY HIGH POINTING ACCURACY

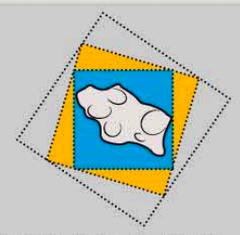
MAXIMUM stability

Cold-gas micro-propulsion system for fine attitude control.

MEASURING INSTRUMENTS OF UNPRECEDENTED PRECISION

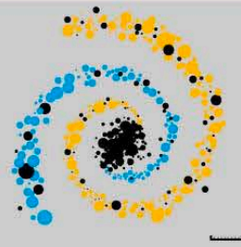
Photometer with a resolution of **1 billion PIXELS** (array of 106 CCD detectors each delivering 9 million pixels).

Capable of detecting stars with a luminosity **400,000 TIMES** lower than those visible to the naked eye.



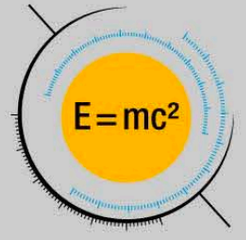
DETECTION AND STUDY OF 200,000 NEW ASTEROIDS

Gaia will log their position and calculate their speed.
A first opportunity to study asteroids in the regions closest to the Sun, normally invisible to telescopes on Earth.



THREE-DIMENSIONAL MAP OF OUR GALAXY, THE MILKY WAY

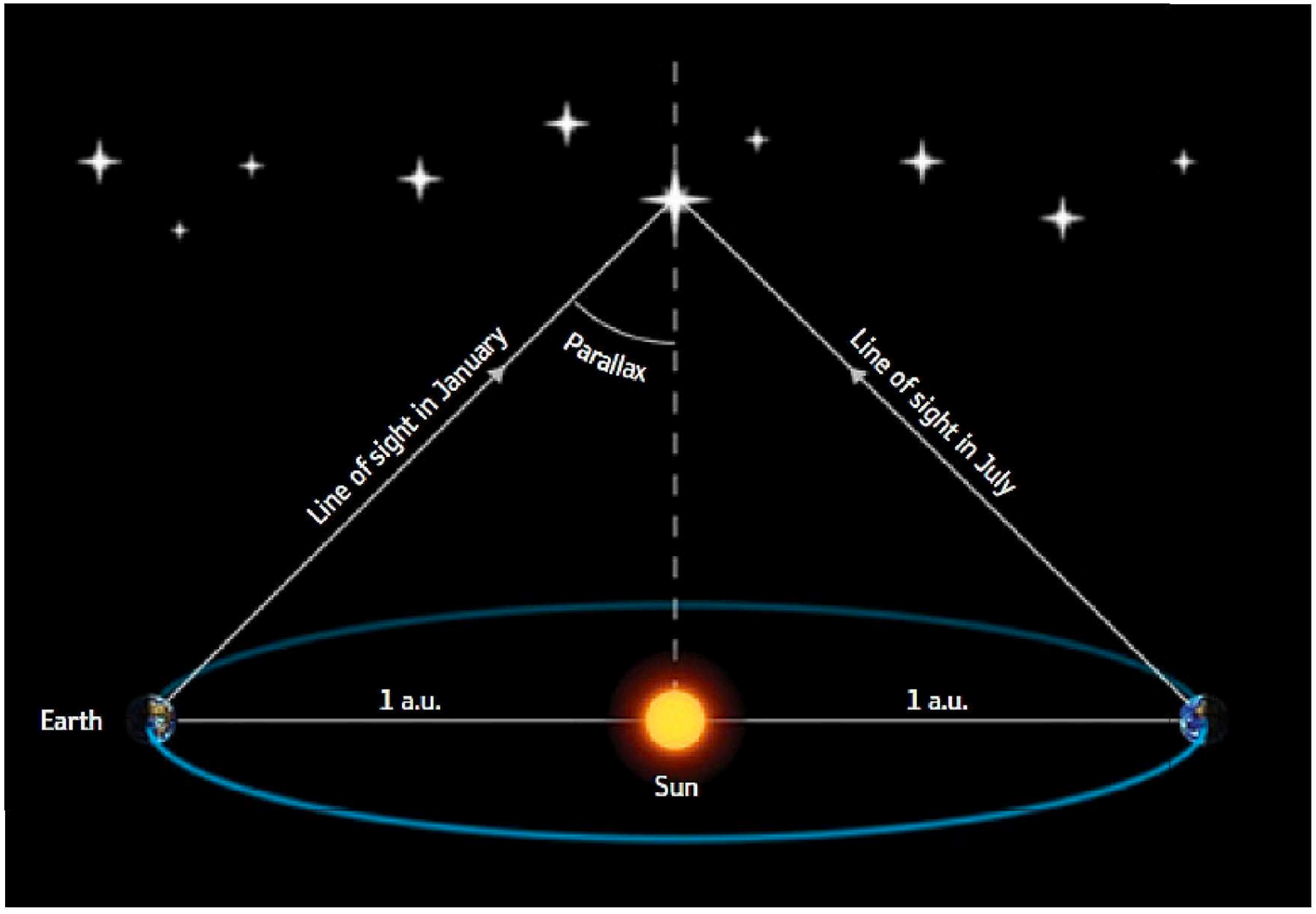
An astronomical census that will provide answers to questions about the formation and evolution of our galaxy.



NEW TESTS OF THE THEORY OF RELATIVITY

Gaia Satellite

- Gaia;s main mode of measure is the Parallax



- This translates to a distance away from us

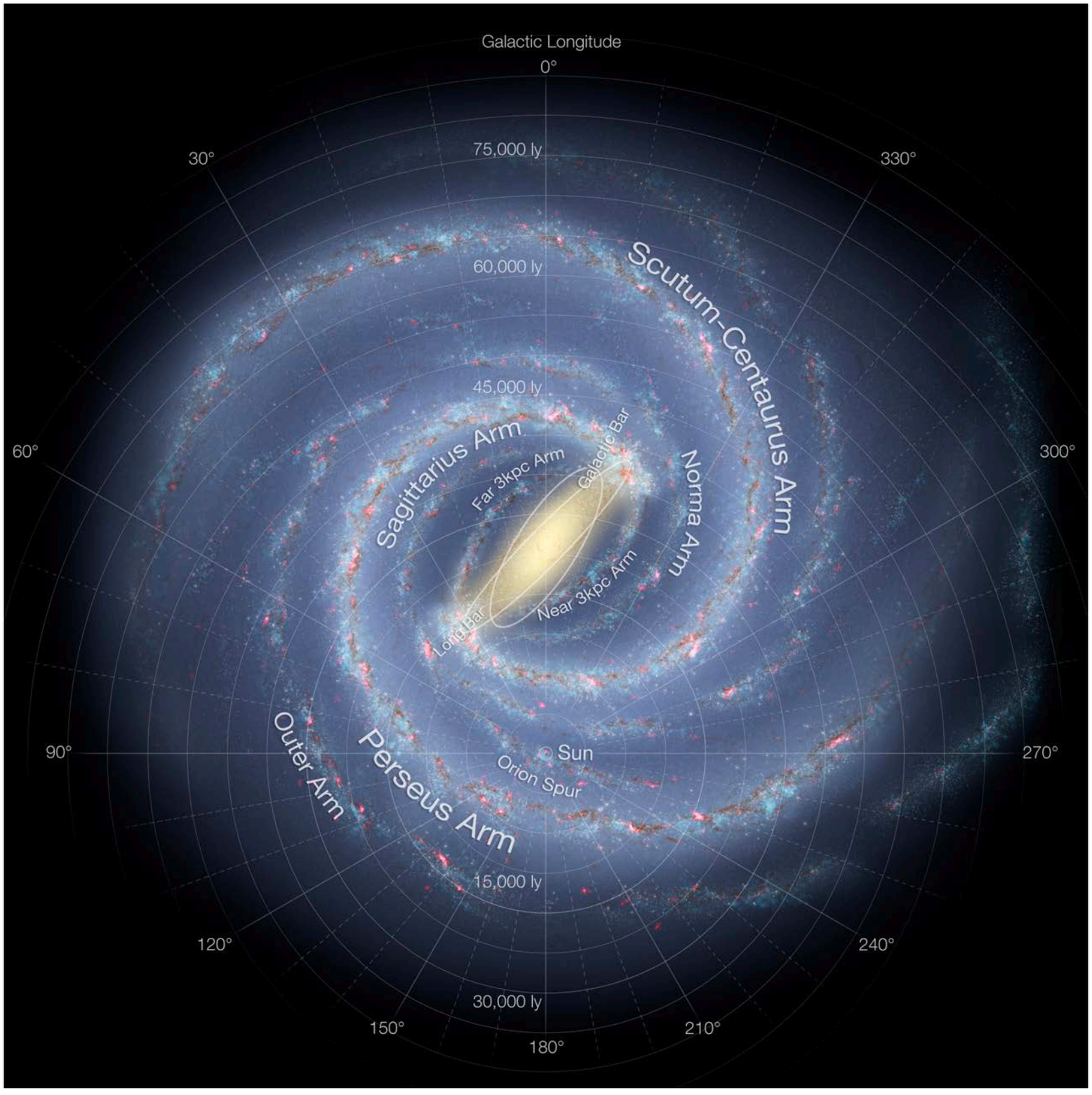
  - Many measurements yields a velocity vector

Full Gaia Stats

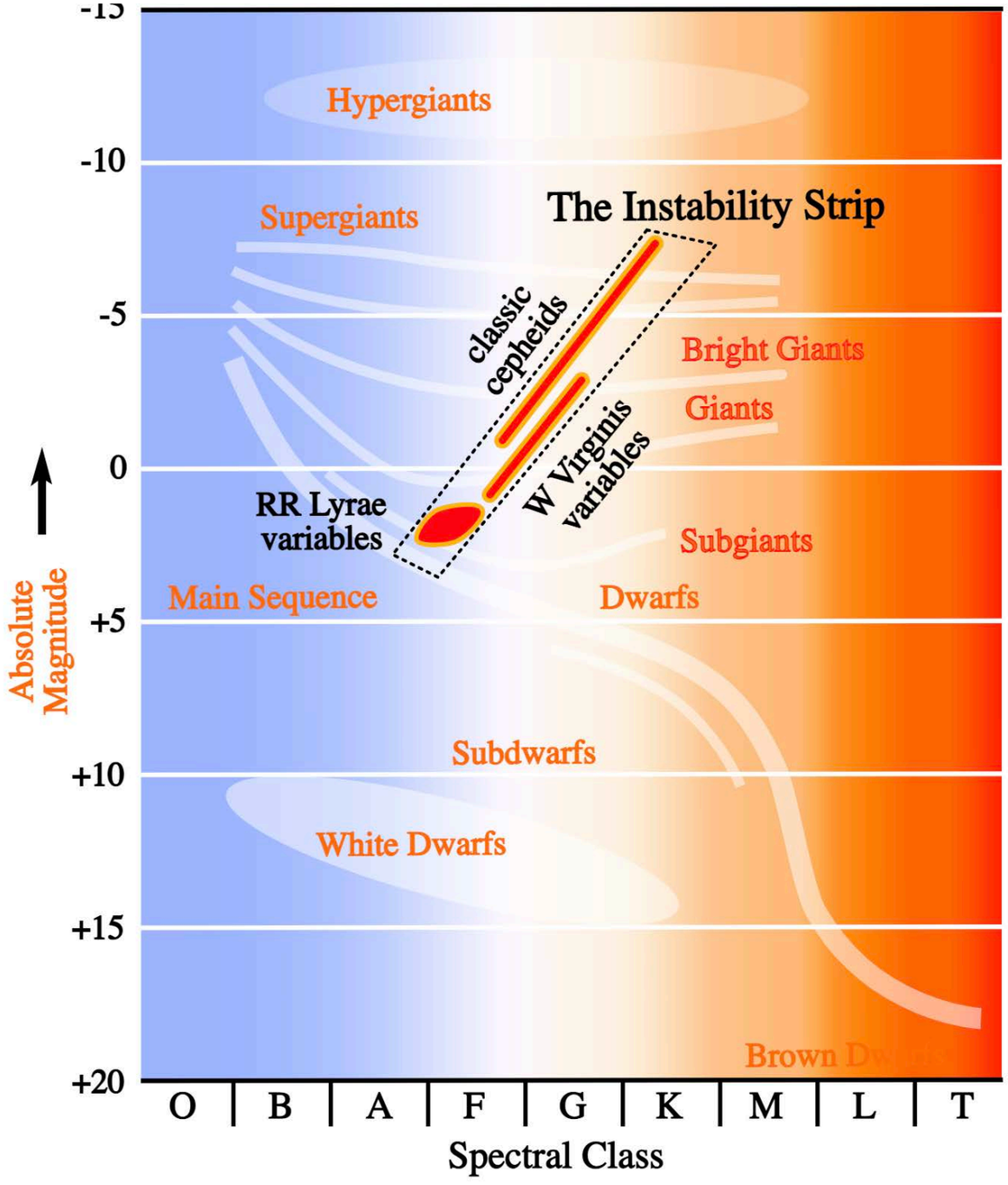
- Gaia has been running for the past 10 years

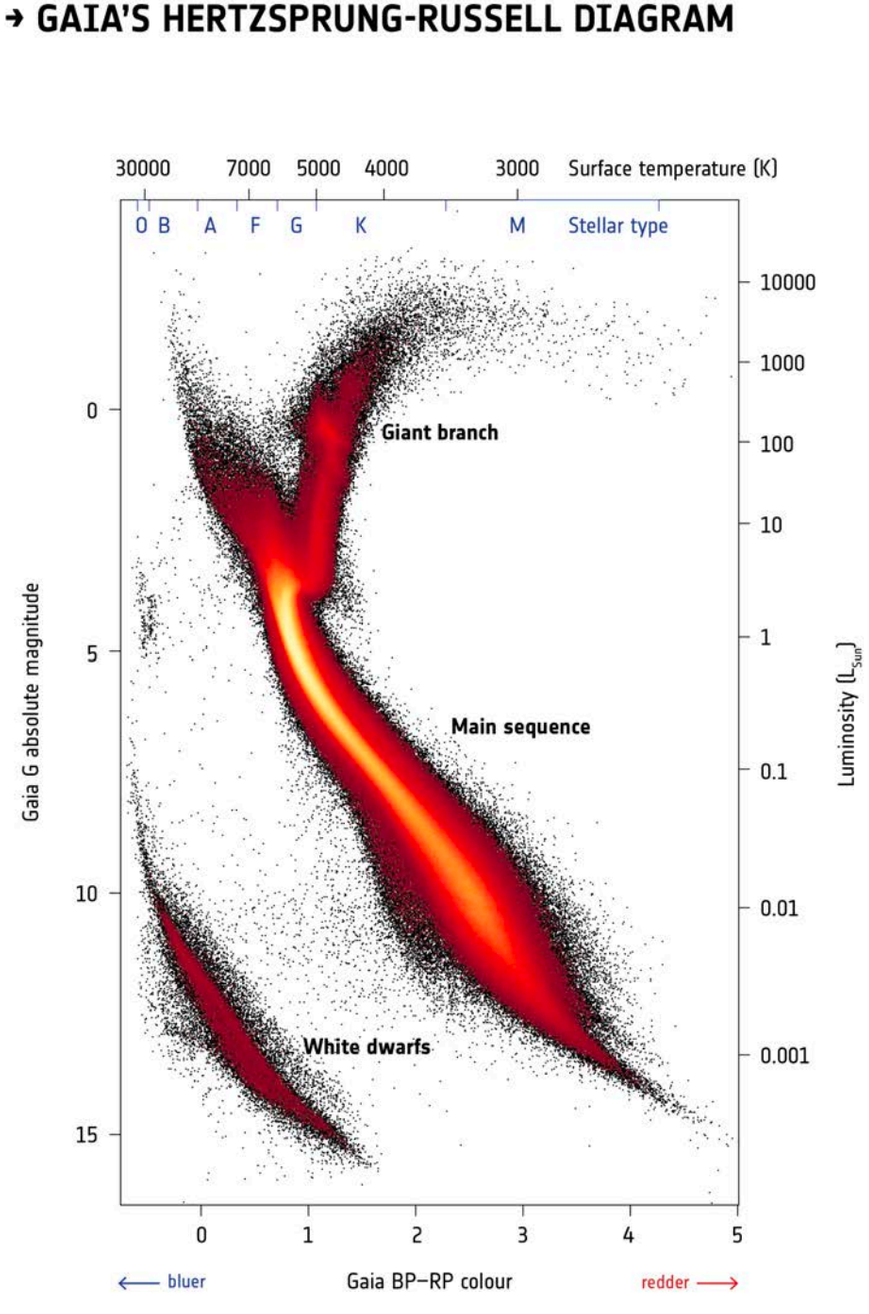
	# sources in Gaia DR3
Total number of sources	**1,811,709,771**
	Gaia Early Data Release 3
Number of sources with full astrometry	1,467,744,818
Number of 5-parameter sources	585,416,709
Number of 6-parameter sources	882,328,109
Number of 2-parameter sources	343,964,953
Gaia-CRF sources	1,614,173
Sources with mean G magnitude	1,806,254,432
Sources with mean G_{BP}-band photometry	1,542,033,472
Sources with mean G_{RP}-band photometry	1,554,997,939
	New in Gaia Data Release 3
Sources with radial velocities	33,812,183
Sources with mean G_{RVS}-band magnitudes	32,232,187
Sources with rotational velocities	3,524,677
Mean BP/RP spectra	219,197,643
Mean RVS spectra	999,645

Star Observations



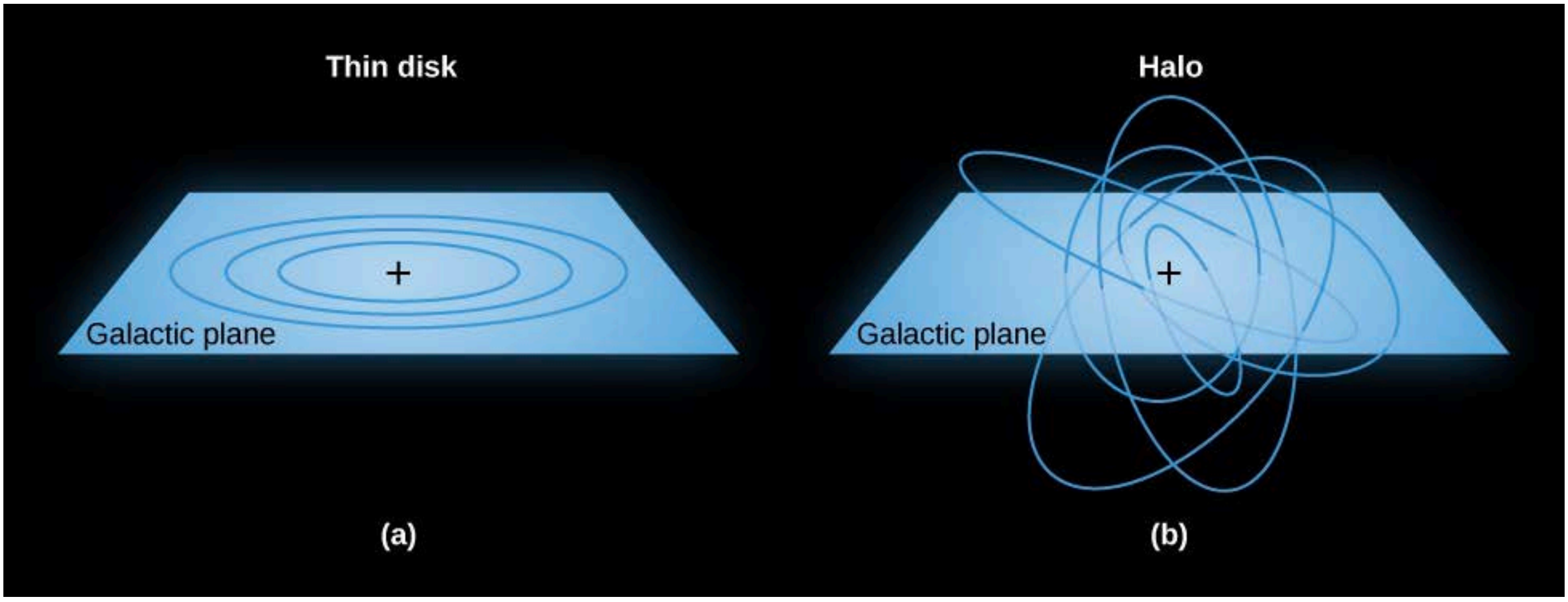
Star Evolution



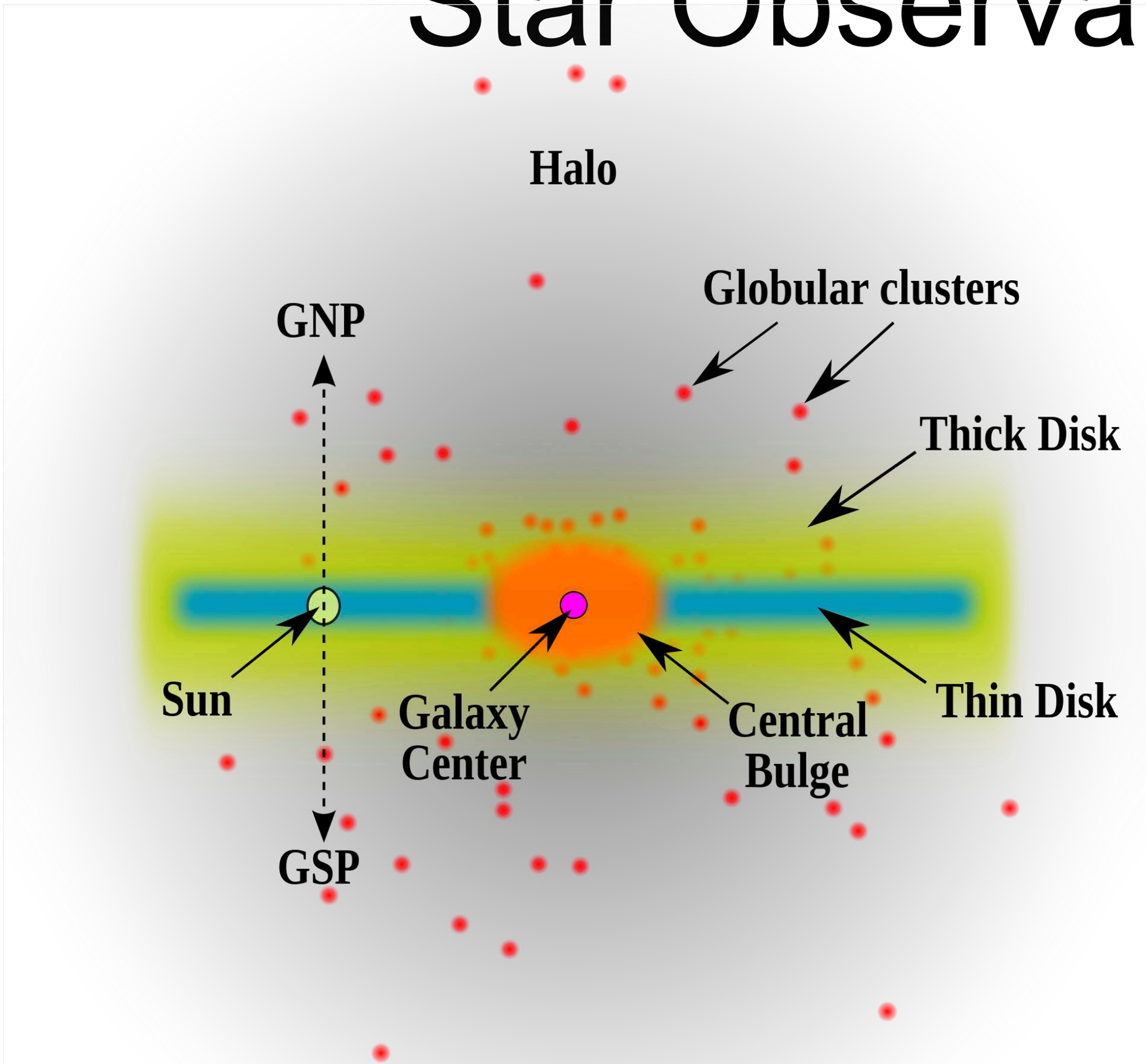


- Hertzpring Russell diagram devots fate of star

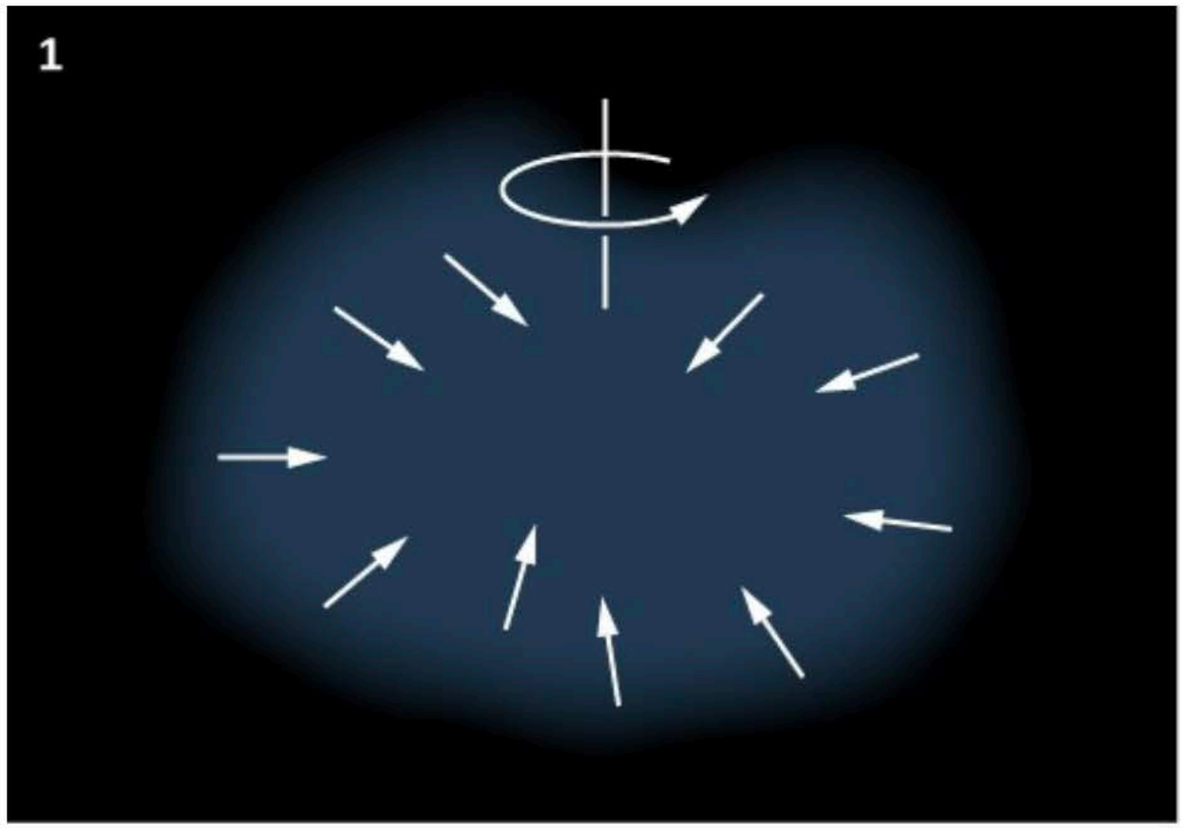
Star Observations

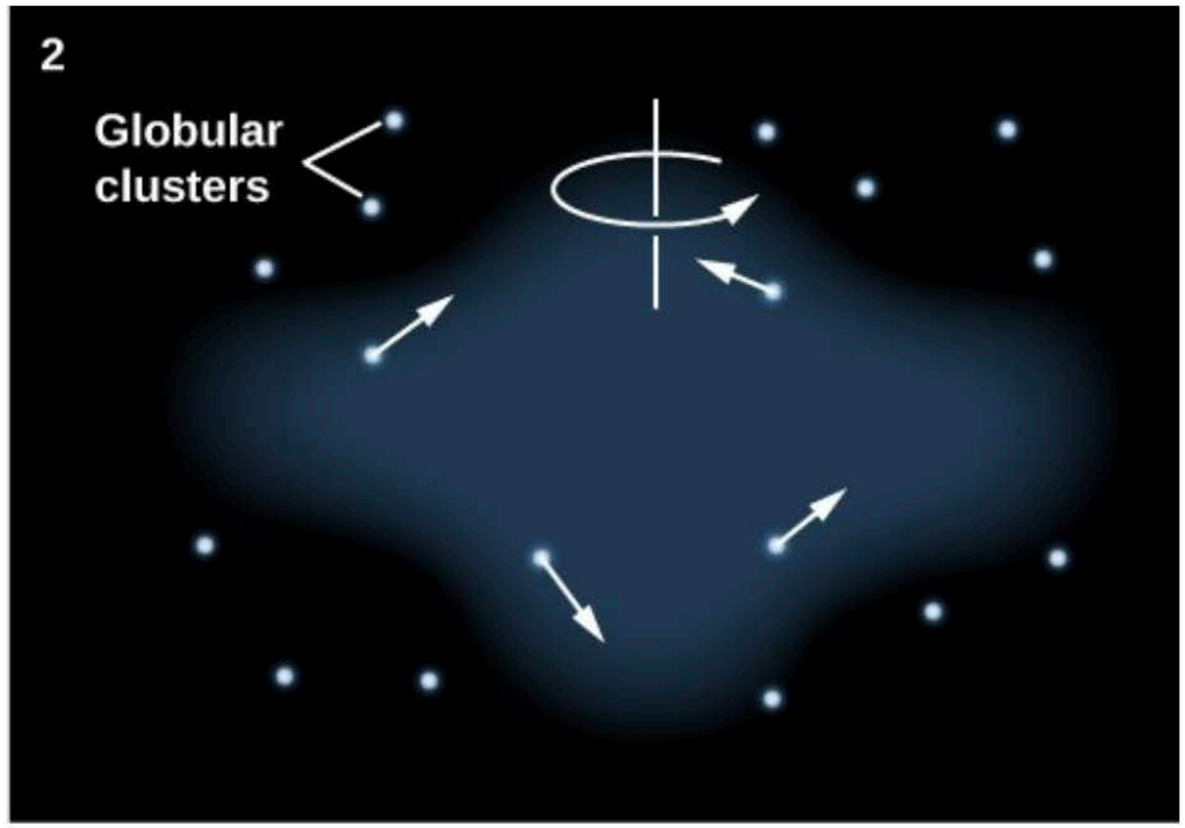


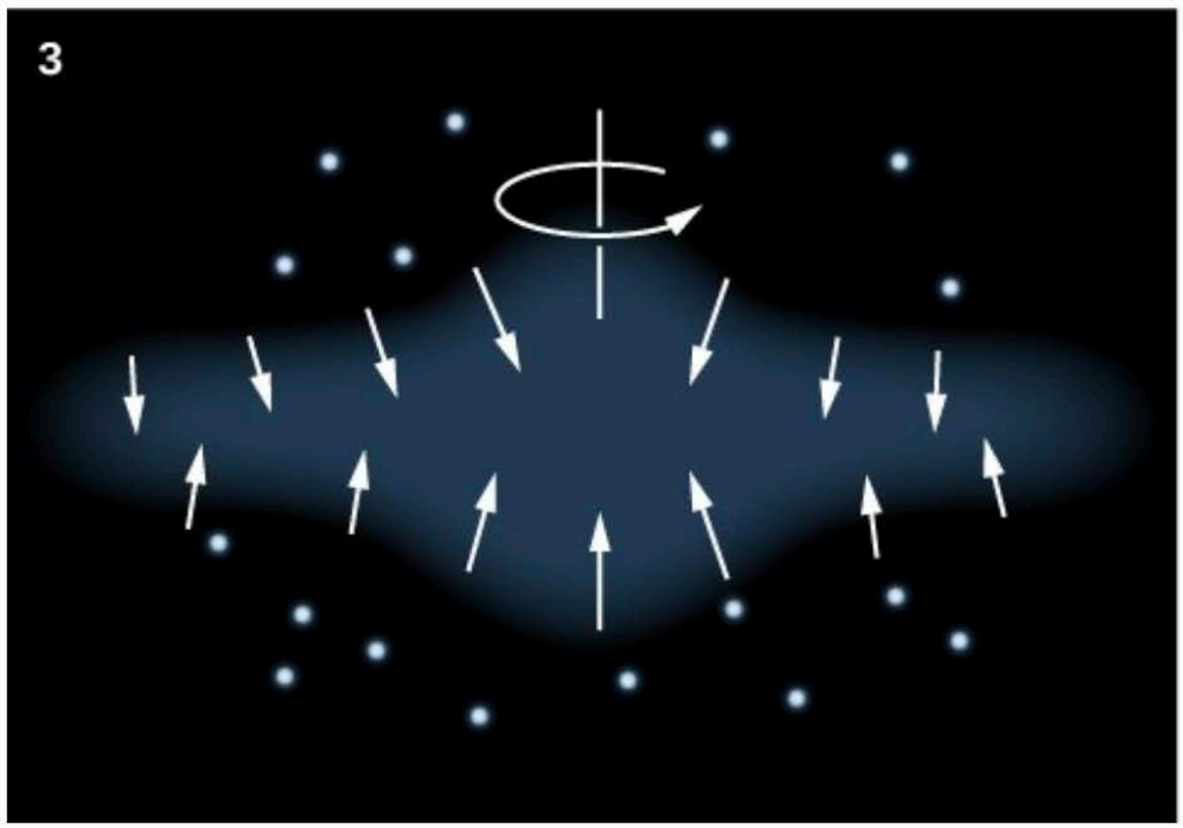
Star Observations



Star Observations







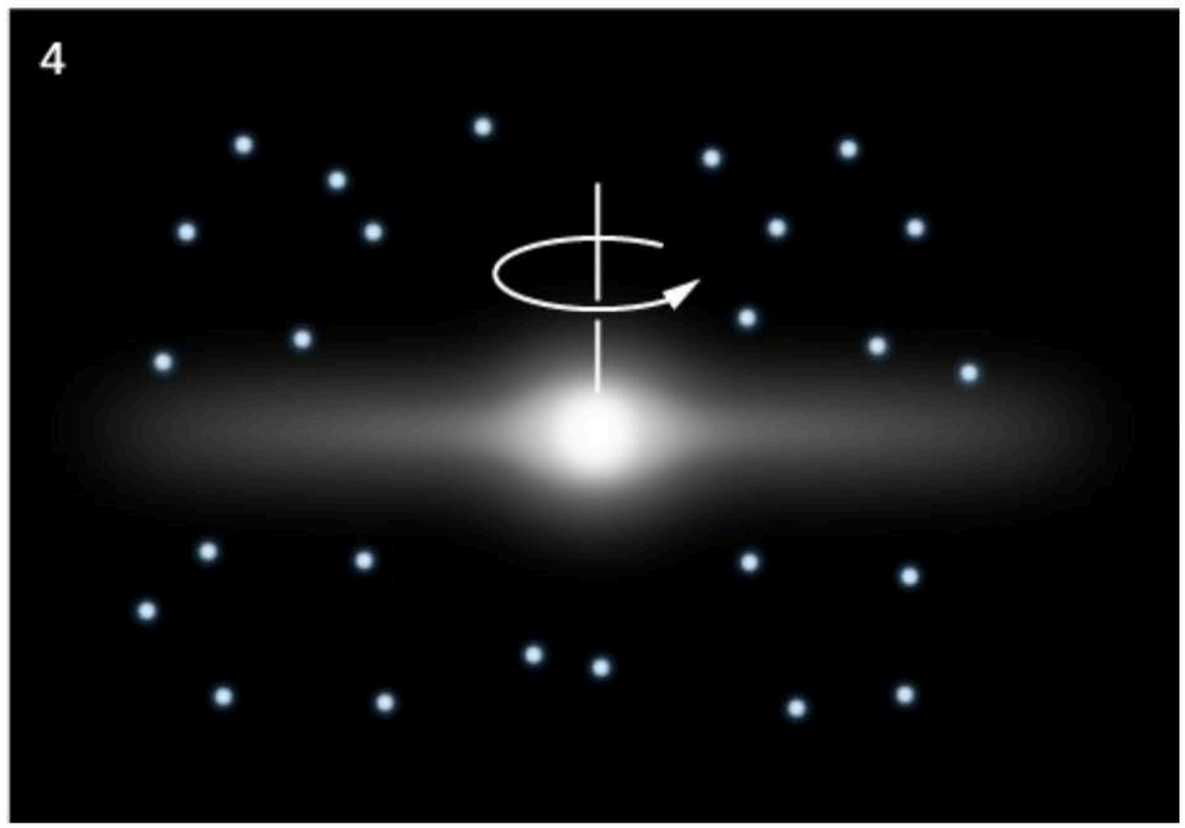


Image Sources

galaxy image

link: https://www.esa.int/ESA_Multimedia/Images/2018/04/Gaia_s_new_map_of_star_density

attribution: ESA/Gaia/DPAC ; Gaia Data Processing and Analysis Consortium (DPAC); A. Moitinho / A. F. Silva / M. Barros / C. Barata, University of Lisbon, Portugal; H. Savietto, Fork Research, Portugal.

gaia infographic

link: https://www.gaia.ac.uk/education/astriums-gaia-satellite-built-map-milky-way

attribution: Astrium

parallax diagram

link: https://www.esa.int/ESA_Multimedia/Images/2013/06/Measuring_stellar_distances_by_parallax

attribution: ESA/ATG medialab

gaia stats

link: https://www.cosmos.esa.int/web/gaia/dr3

attribution: ESA

galactic coordinates diagram

link: https://commons.wikimedia.org/wiki/File:Artist%27s_impression_of_the_Milky_Way_(updated_-_annotated).jpg

attribution: NASA/JPL-Caltech/ESO/R. Hurt, Public domain, via Wikimedia Commons

Image Sources

HR diagram depiction

link: https://commons.wikimedia.org/wiki/File:HR-diag-instability-strip.svg

attribution: Rursus, CC BY-SA 3.0 <http://creativecommons.org/licenses/by-sa/3.0/>, via Wikimedia Commons

HR diagram with data

link: https://commons.wikimedia.org/wiki/File:Gaia%E2%80%99s_Hertzsprung-Russell_diagram_ESA393151.jpg

attribution: ESA/Gaia/DPAC, CC BY-SA 3.0 IGO <https://creativecommons.org/licenses/by-sa/3.0/igo/deed.en>, via Wikimedia Commons

galactic plane vs. halo

link: https://courses.lumenlearning.com/suny-astronomy/chapter/stellar-populations-in-the-galaxy/

attribution: lumenlearning

edge-on galaxy illustration

link: https://commons.wikimedia.org/wiki/File:Milky_way_profile.svg

attribution: RJHall at English Wikipedia, CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons

star motion diagrams

link: https://pressbooks.bccampus.ca/astronomy1105/chapter/25-6-the-formation-of-the-galaxy/

attribution: © 2017 by Douglas College Department of Physics and Astronomy