

SMAS Photos M31

What is in those photos

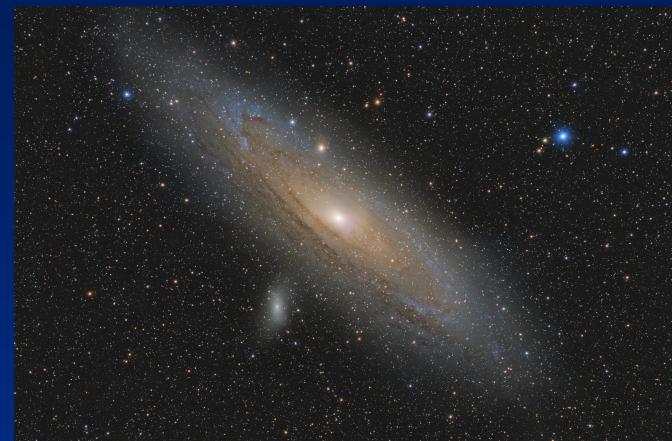
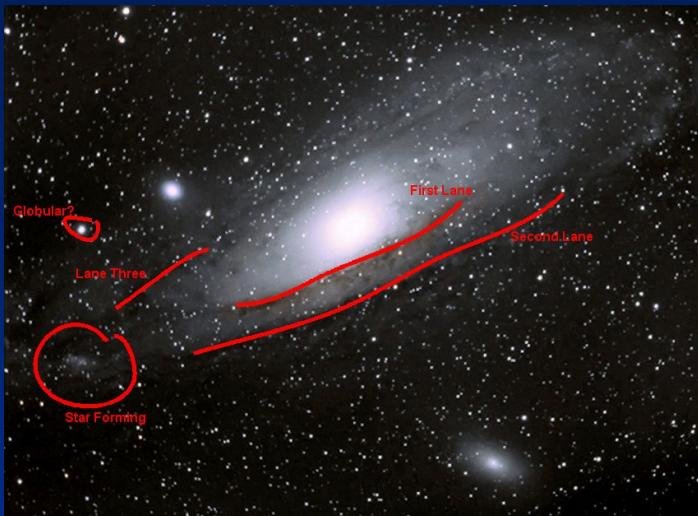
by

Lee Erickson



Great Galaxy in Andromeda

M31 and more



Duane Dunlap

Peggy Burkman,

Jamie Church,

James Cantu,

And more...

Seestar 50
Pb / 84° W, 35° N / 2025.09.30 01:09

M 31
45min



Great Galaxy in Andromeda

M31 and more



**Gene Johnson,
F Lee Erickson,
Shawn Harrison,
Others???**



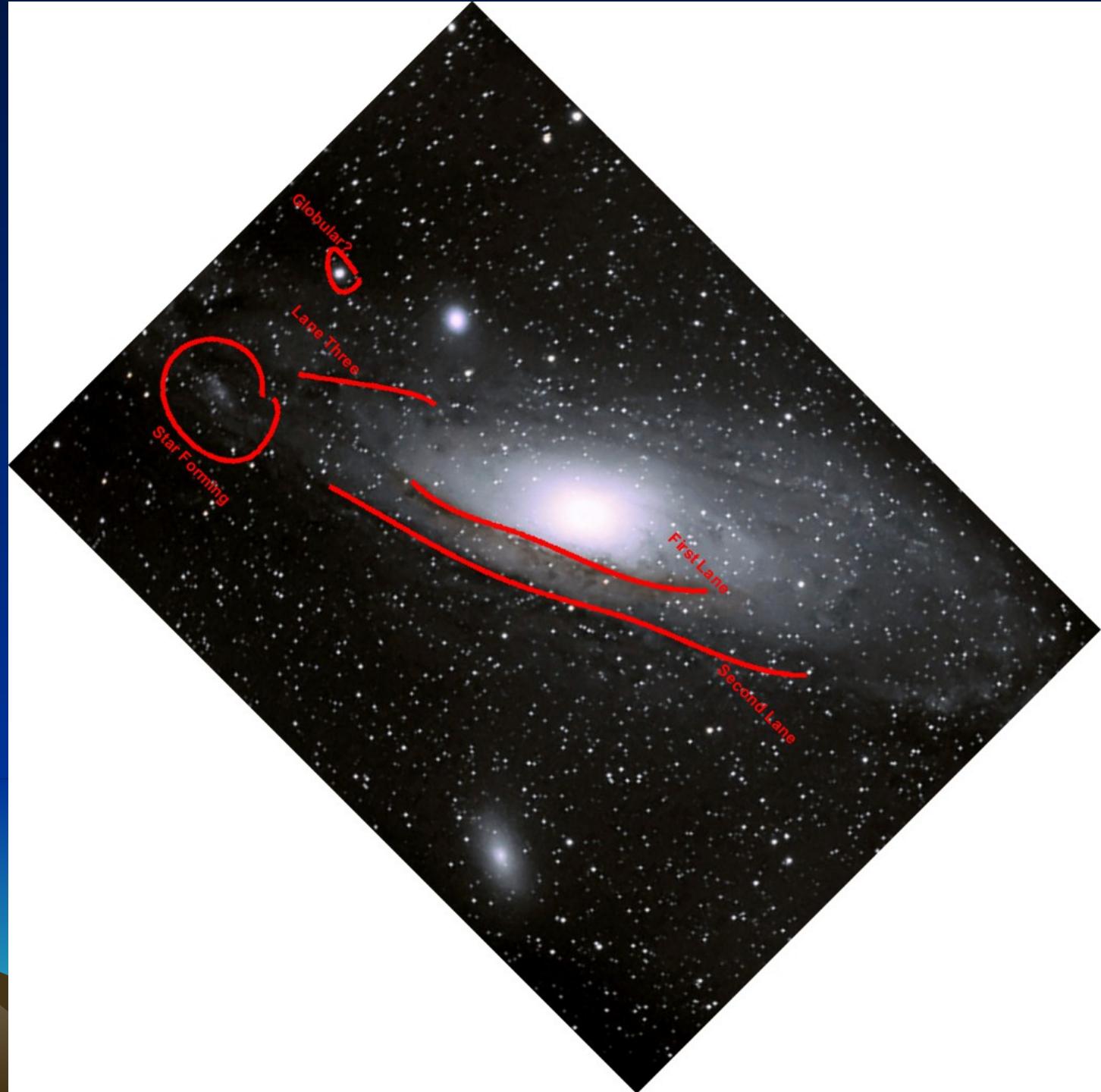
Annotation of 2014 photo by Duane Dunlap.

What have we
got here?

Dust lanes

Satellite
galaxies, M32
and M110.

Star Forming
region.



2014 photo by
Duane
Dunlap.

How much
dust?

1.8×10^8
means about
180 Billion
solar
masses.

How many stars
in M31?



How much dust in in the M31 dust lanes

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◆ AI Overview

The dust in the Andromeda Galaxy (M31) is estimated to be around $5.4 \times 10^7 M_{\odot}$ within the disk and about $1.8 \times 10^8 M_{\odot}$ in the halo, with approximately 75% of the total dust mass located in the halo, according to IOPscience. This means there is significantly more dust in the halo than in the disk, which is primarily made up of obscuring clouds seen as dark lanes against the galaxy's brighter parts.

- **Disk dust:** The dust mass in M31's disk is estimated to be about $5.4 \times 10^7 M_{\odot}$.
- **Halo dust:** The dust mass in M31's halo is estimated to be around $1.8 \times 10^8 M_{\odot}$.
- **Distribution:** Roughly 75% of the total dust mass is in the halo, and the remaining 25% is in the disk.
- **Dust lanes:** The visible dust lanes are dense, obscuring clouds of this interstellar dust that are seen against the galaxy's brighter parts.

2014 photo by Duane Dunlap.

Satellite galaxies, M32 and M110.

❖ AI Overview

The combined mass of M32 and M110 is approximately 13 billion solar masses.

- **M32:** The mass of the dwarf elliptical galaxy M32 is estimated to be about 3 billion solar masses.
- **M110:** The dwarf elliptical galaxy M110 has an estimated mass between 4 and 15 billion solar masses. A more specific estimate is 10 billion solar masses.

Based on these estimations, the combined mass would be $3 \times 10^9 + 10 \times 10^9 = 13 \times 10^9$ solar masses. The combined mass of M32 and M110 is approximately **13 billion solar masses**.

- The mass of M32 is estimated to be about 3 billion solar masses.
- The mass of M110 is estimated to be around 10 billion solar masses, though some sources provide a range of 4 to 15 billion solar masses.

2014 photo by
Duane
Dunlap.

Star Forming
region.

An OB
association.

Designation:
NGC 206



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AI Overview

OB associations are large, unbound groups of young, bright, and massive stars in the Andromeda galaxy (M31) that are similar to those in our own Milky Way. Studied through observations like UBV photometry and CCD imaging, these associations are found throughout M31's spiral arms and can include a dense core of young stars and older stellar envelopes. M31 contains many such associations, including the well-studied NGC 206, and they are key to understanding star formation in the galaxy.

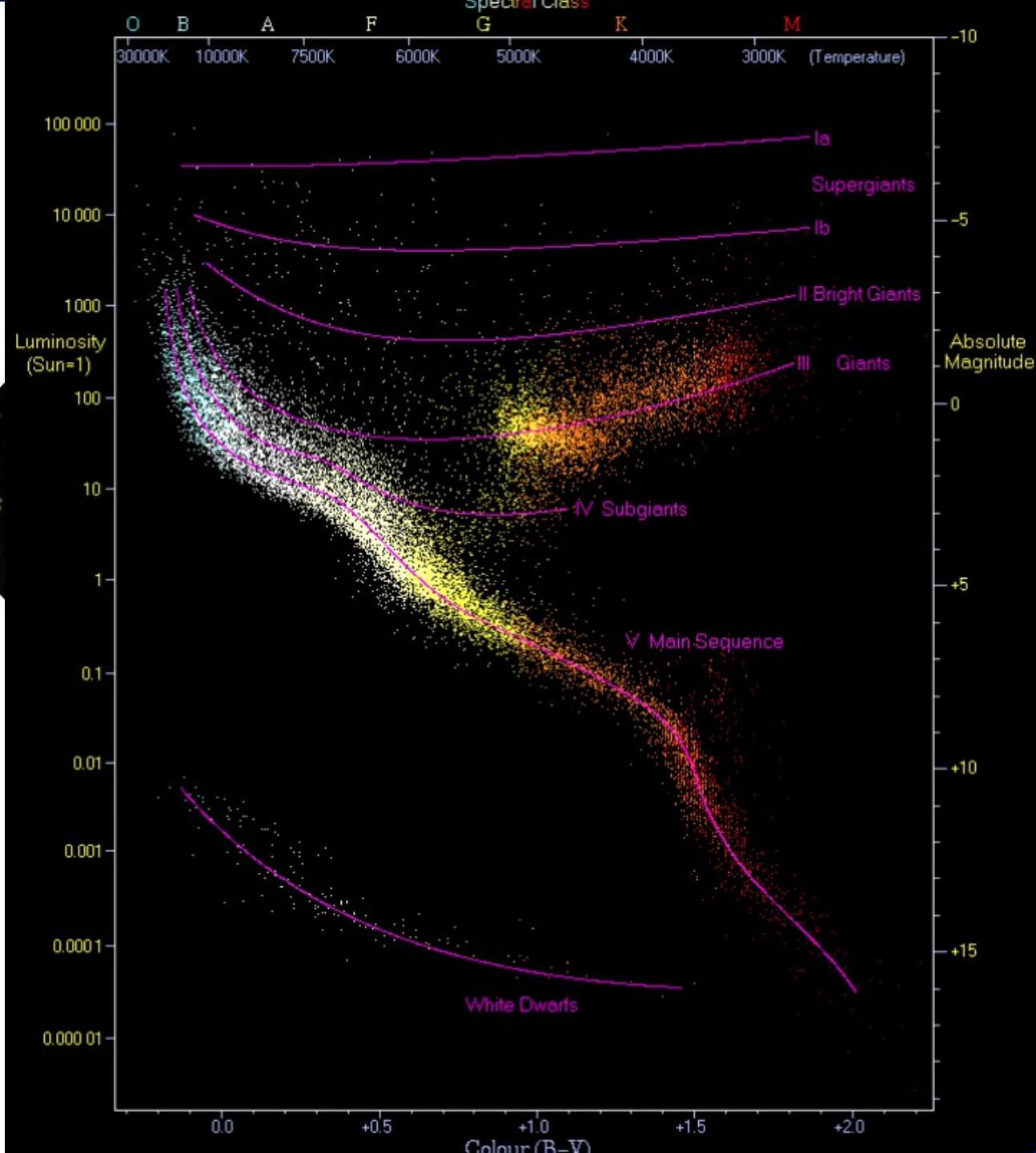
Key characteristics of M31's OB associations

- **Composition:** They are composed of young, hot, and luminous stars, primarily of spectral types O and B.
- **Structure:** Some associations are seen to have dense cores surrounded by older stellar populations.
- **Location:** They are found within the spiral arms of M31, with some studies showing a correlation between the northern disk clusters and giant molecular clouds.
- **Size:** Their physical sizes are comparable to those of OB associations in other galaxies, such as the Orion OB1 Association in the Milky Way.
- **Star formation:** They are a significant site of star formation. Studies have estimated that new OB associations form in M31 every 1 million years.
- **Notable examples:** The NGC 206 association is a particularly well-studied example, with research focusing on its massive stars and stellar population.
- **Age variations:** Different spiral arm segments in M31 appear to have different ages, which can be determined by studying the stars within the associations.

2014 photo by
Duane
Dunlap.

An OB
association.

Composed of
young, hot,
and luminous
stars,
primarily of
spectral
types O and
B.



2024 photo by

Jamie

Church.

A lesson in
image
processing.
Center is not
as over
exposed.

Review

SMAS members have captured

Dust Lanes
OB Association
Globular Clusters?



