Discovery of The Big Bang
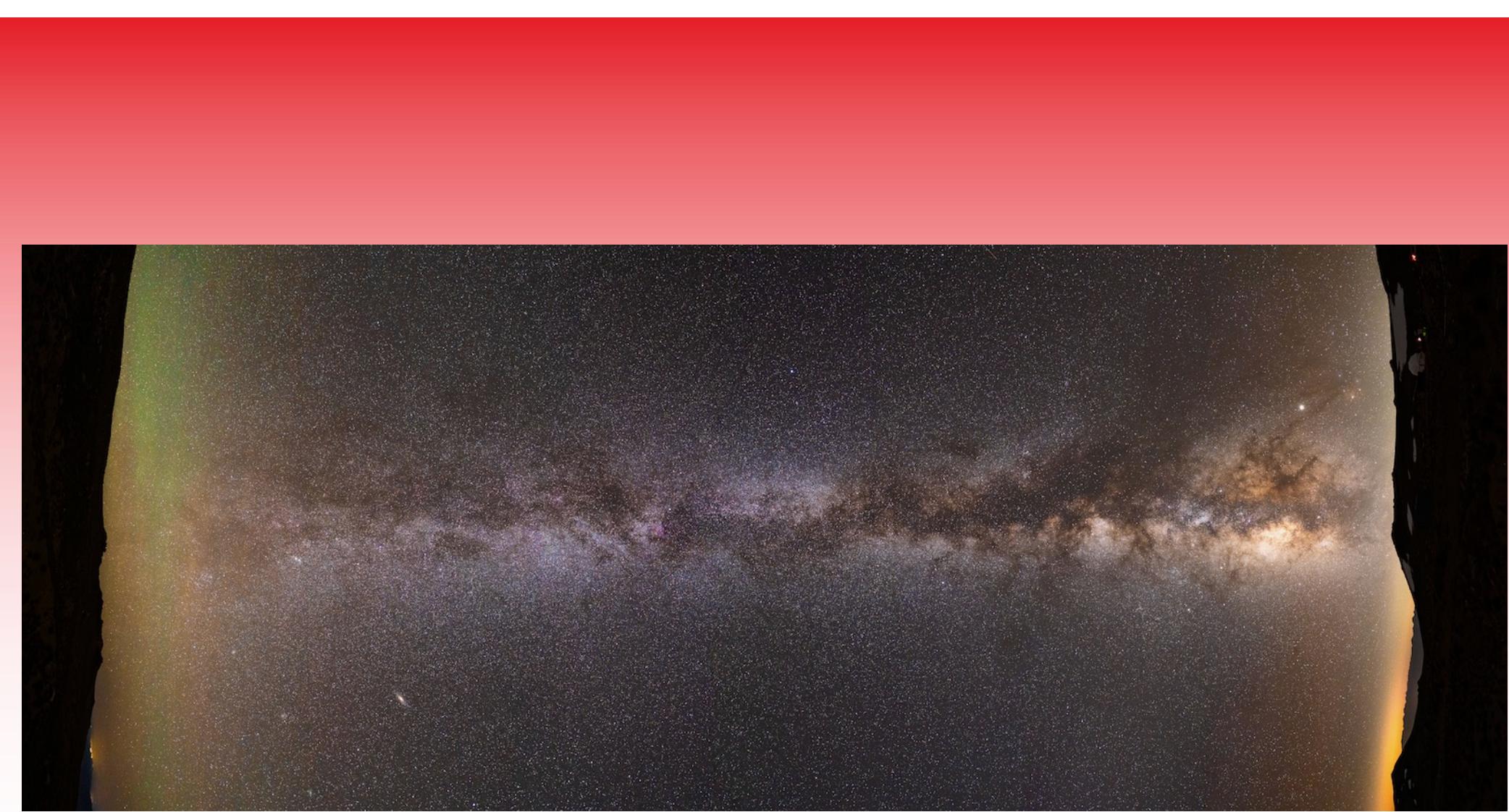
Hubble from 1925 to 1929

*Physics 090*

2020-05-08

SAINT MARY'S COLLEGE of CALIFORNIA
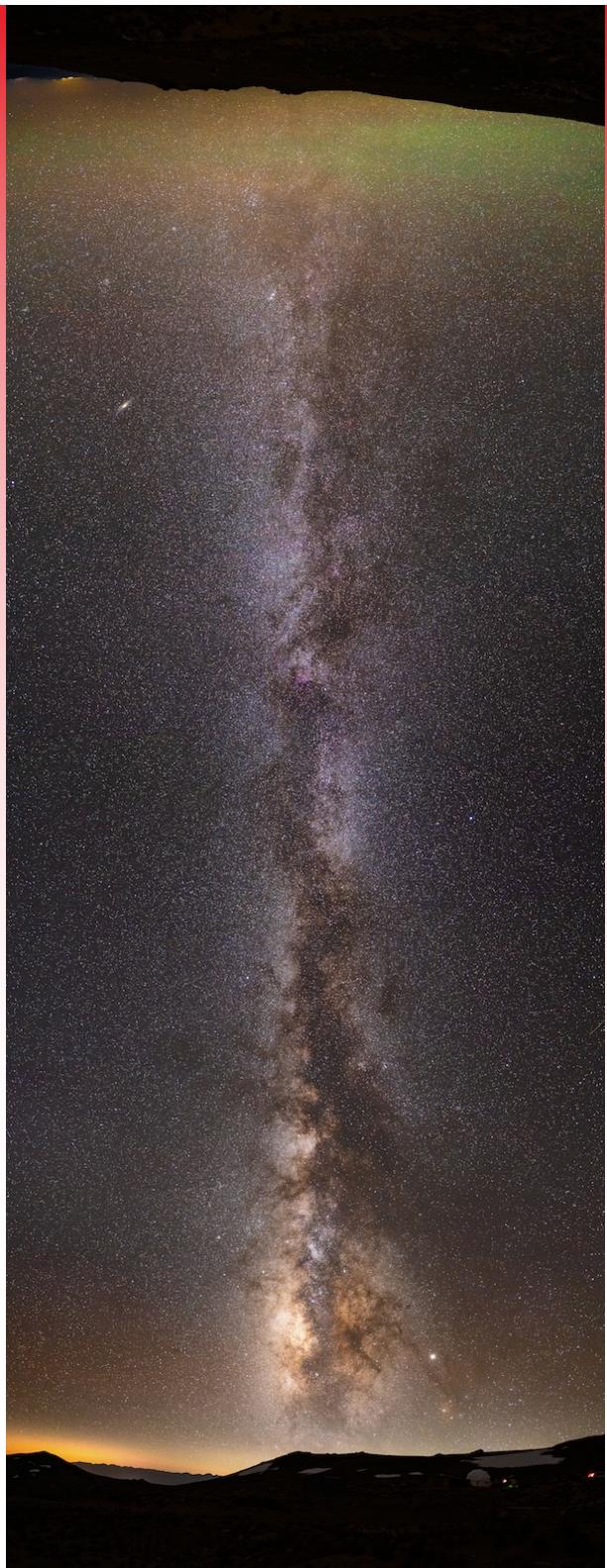
Brian Hill and Connor Martin, photo by Brian Fulda

Milky Way, Horizon to Horizon, Brian Fulda

Torben Hansen - https://www.flickr.com/photos/torbenh/6105409913
Andromeda Galaxy (M33), with M32 and M110

Triangulum Galaxy (M31), Connor Martin, Brian Hill, Brian Fulda

Cepheids in Spiral Nebulæ*.

MESSIER 31 † and 33, the only spirals that can be seen with the naked eye, have recently been made the subject of detailed investigations with the 100-inch and 60-inch reflectors of the Mount Wilson Observatory. Novæ are a common phenomenon in M 31, and Duncan has reported three variables within the area covered by M 33 ‡. With these exceptions there seems to have been no

* Abstract of paper read at the Thirty-Third Meeting of the American Astronomical Society. From *Popular Astronomy*, vol. xxxiii. No. 4, April 1925.
† Messier 31 is the Andromeda Nebula.
‡ *Publications of the Astronomical Society of the Pacific*, xxxv. p. 290 (1922).

Edwin Hubble, April, 1925

Cepheids in M 31. }

Var. No.		Period in Days.	Log. P.	Photographic Magnitude. Max.
5	....	50·17	1·70	18·4
7	....	45·04	1·65	18·15
16	....	41·14	1·61	18·6
9	....	38	1·58	18·3
1	....	31·41	1·50	18·2
12	....	22·03	1·34	19·0
13	....	22	1·34	19·0
10	....	21·5	1·33	18·75
2	....	20·10	1·30	18·5
17	....	18·77	1·28	18·55
18	....	18·54	1·27	18·9
14	....	18	1·26	19·1

Cepheids in M31, Andromeda Galaxy

Cepheids in M 33.

Var. No.	Period in Days.	Log. P.	Photographic Magnitudes.	
			Max.	Min.
30	46·0	1·66	18·33	19·25
3	41·6	1·62	18·45	19·4
36	38·2	1·58	18·45	19·1
31	37·3	1·57	18·30	19·2
29	37·2	1·57	18·55	19·15
20	35·95	1·56	18·50	19·2
18	35·5	1·55	18·45	19·15
35	31·5	1·50	18·55	19·35
42	31·1	1·49	18·65	19·35
44	30·2	1·48	18 70	
40	26·0	1·41	19·00	
17	23·6	1·37	18·80	
11	23·4	1·37	18·85	
22	21·75	1·34	19·00	
12	21·2	1·33	18·80	
27	21·05	1·32	18·85	
43	20·8	1·32	18·95	
33	20·8	1·32	18·75	
10	19·6	1·29	18·80	
41	19·15	1·28	18·75	
37	18·05	1·26	18·95	
15	17·65	1·25	19·05	

Cepheids in M33, Triangulum Galaxy

the same paper, and the result represents his original data. The slope is of the order of that for spirals, but is not precisely the same. In comparing the two, greater weight must be given to the brighter portion of the curve for the spirals, because of the greater reliability of the magnitude determinations. When this is done, the resulting values of M−m are −21·8 and −21·9 for M 31 and M 33 respectively. These must be corrected by half the average ranges of the Cepheids in the two spirals, and the final values are then on the order of −22·3 for both nebulæ. The corresponding distance is about 285,000 parsecs *. The greatest

$$M - m = -22.3$$
285,000 parsecs

10 * 10^(22.3/5)=288,403
938,000 light-years (way off)
2,540,000 is the modern number ±110,000