True Luminosity

for Orchestra

Amy Nam

2025

Instrumentation

2 Flutes (2nd doubling piccolo)
2 Oboes
2 Clarinets in B♭
2 Bassoons

2 Horns in F
2 Trumpets in C
1 Tenor Trombone
1 Bass Trombone
1 Tuba

Timpani (32", 29", 26", 23")

Percussion 1
- Glockenspiel
- 4 Wood Blocks
- Tam tam
- Slapstick

Percussion 2
- Vibraphone (no motor required)
- 4 Tom toms

Percussion 3
- Bass Drum
- Snare Drum

Harp

Piano

Strings

Duration: 6:45

Accidentals pertain throughout the measure.

Notes

In 1912 astronomer Henrietta Swan Leavitt (1868–1921) published a discovery that would blow open humanity's understanding of the scale of our universe.

While working at Harvard College Observatory tediously documenting the brightness of Cepheid variables, a type of star whose brightness fluctuates, Leavitt discovered an exact relationship governing the length of time between a Cepheid's bright peaks (its period) and the magnitude of a Cepheid's brightness (its luminosity).

Simplified, this period-luminosity relationship, now also known as Leavitt's Law, states that the brighter the star, the longer its period.

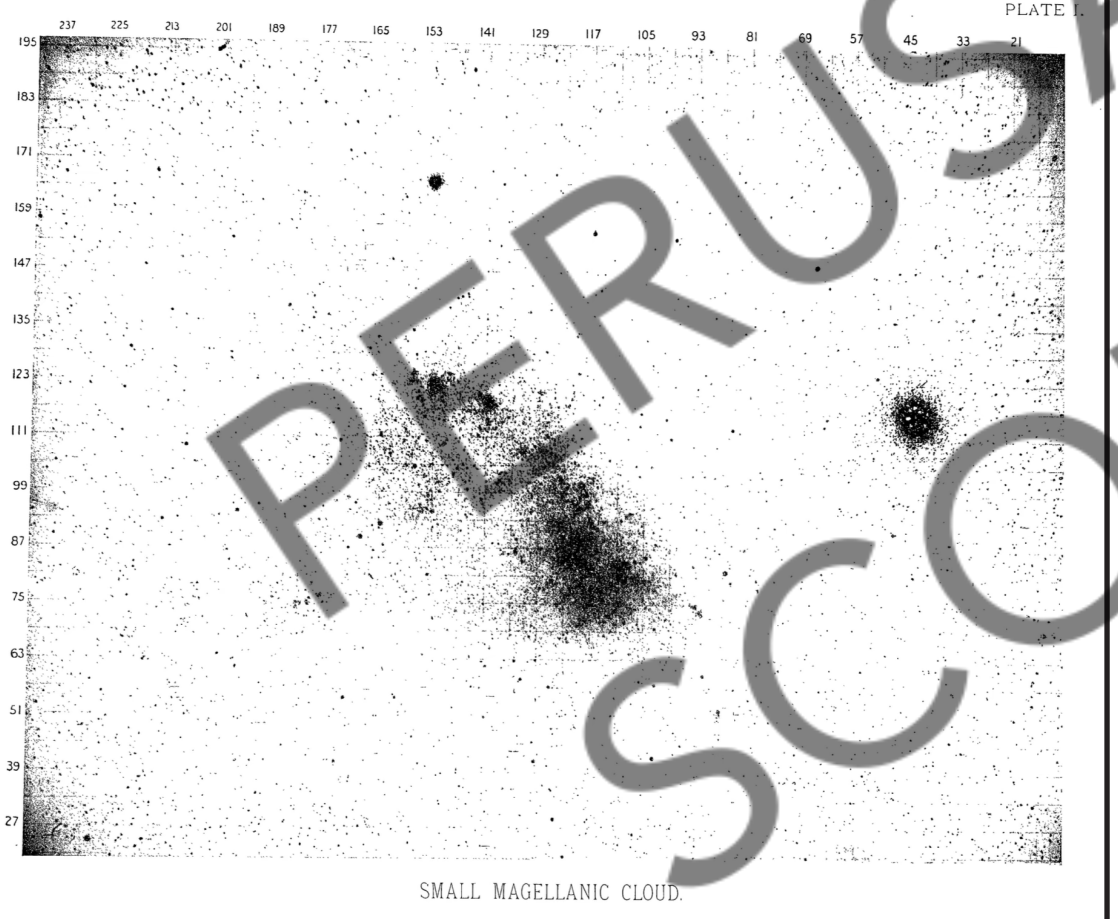
So how did Leavitt's discovery radically expand our understanding of the universe's scale?

Before Leavitt's discovery, humans were restricted to the parallax method for measuring interstellar distances. The parallax method involves using trigonometry to calculate the distance to a star, taking advantage of the fact that measurements made from opposite sides of Earth's orbit around the Sun form two points of a triangle in relation to the star in question. However, the parallax method is not useful if the star is so far away that the angles measured from opposite sides of Earth's orbit are practically the same (imagine an extremely wide triangle with a height so negligible that the triangle looks almost like a straight line).

However, Leavitt's discovery presented humanity with a new yardstick. After the relationship between distance, brightness, and period was calibrated (by measuring the distance to the closest Cepheids via parallax), one could then look at any Cepheid variable, no matter how far away, and simply compare its observed luminosity with its true luminosity, a value which can now be calculated using Leavitt's Law. This difference between the star's true and observed luminosities allows the distance to the star to be exactly determined.

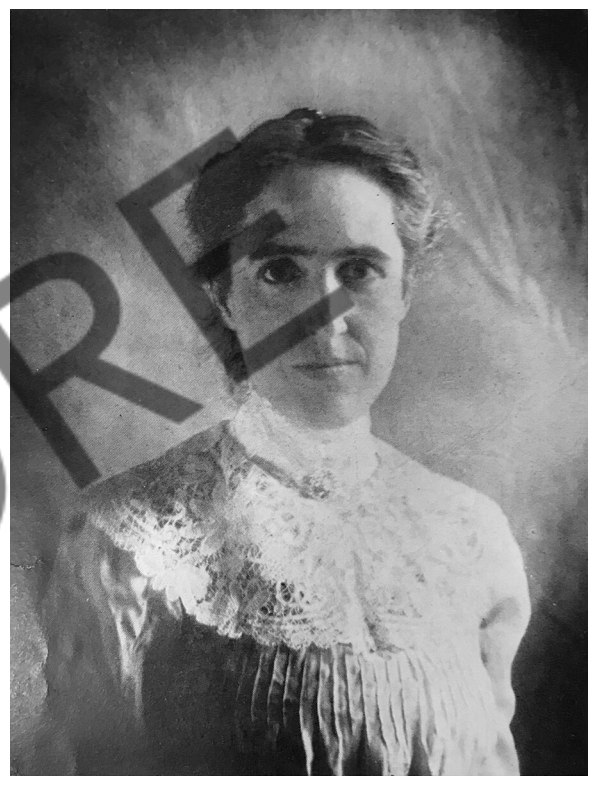
In the years following Leavitt's premature death, astronomers including Edwin Hubble would build on Leavitt's discovery to demonstrate that the universe was not comprised solely of the Milky Way Galaxy, as some supposed, but in fact contains multitudes of galaxies.

True Luminosity draws inspiration from the astonishing vastness of space, the quick flare and long decay of Cepheid variables' pulsation, and the joy I imagine Leavitt must surely have had in her discovery. – ***Amy Nam*** (b. 1994)

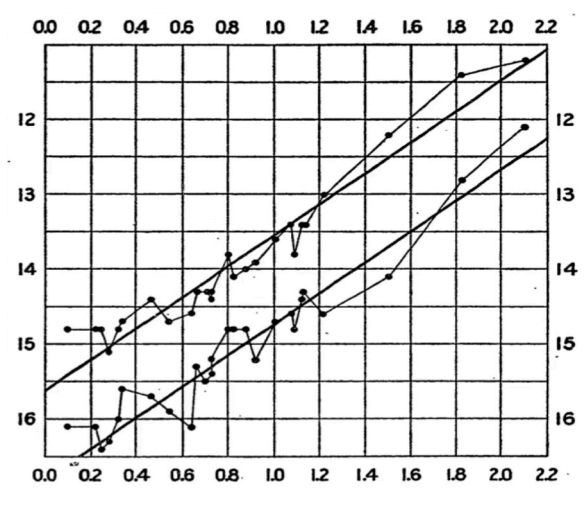


"The measurement and discussion of these objects present problems of unusual difficulty, on account of the large area covered by the two regions, the extremely crowded distribution of the stars contained in them, the faintness of the variables, and the shortness of their periods."

Image from Leavitt's 1907 paper, "1777 Variables in the Magellanic Clouds".
Text from her 1912 paper, "Periods of 25 Variable Stars in the Small Magellanic Cloud"



Henrietta Swan Leavitt



Magnitude is represented on the y-axis. (The lower the magnitude, the brighter the star.) The x-axis represents the logarithm of the period expressed in the number of days. The two lines represent the magnitudes at each star's maximum and minimum brightness.

Image from Leavitt's 1912 paper, "Periods of 25 Variable Stars in the Small Magellanic Cloud"

transposed score

True Luminosity

to the memory of Henrietta Swan Leavitt

Amy Nam

distant, glittering, with wonder (♩ = c. 76)

Flute 1 2

Oboe 1 2

Clarinet in B♭ 1 2

Bassoon 1 2

Horn in F 1 2

Trumpet in C 1 2

Trombone 1 2

Tuba

Timpani

Percussion 1

Glockenspiel

pp

Percussion 2

Vibraphone

pp

Ped.

Percussion 3

Harp

Piano

8va

pp

Violin I

Violin II

Viola

Violoncello

Double Bass

1 2 3 4 5 6

rit......**pulsing, brilliant** (♩ = c. 86)

7 A

Fl. 1 2
Ob. 1 2
Cl. in B♭ 1 2
Bsn 1 2
Hn in F 1 2
Tpt in C 1 2
Tbn. 1 2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I
Vln II
Vla
Vc.
D. B.

(Glock.)
(Vib.)
(Ped.)
Ped.
Bass Drum
(8)
8va

7 8 9 10 11 12

13 B

Fl. 1 2
Ob. 1 2
Cl. in B♭ 1 2
Bsn 1 2
Hn in F 1 2
Tpt in C 1 2
Tbn. 1 2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I
Vln II
Vla
Vc.
D. B.

(Glock.)
(Vib.)
(Ped.)
(B. Dr.)
C to B♭
unis.
Ped.

13 14 15 16 17 18 19 20

21 C

Fl. 1
Fl. 2
Ob. 1
Ob. 2
Cl. in B♭ 1 2
Bsn 1 2
Hn in F 1 2
Tpt in C 1 2
Tbn. 1 2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I
Vln II
Vla
Vc.
D. B.

(Glock.)
(Vib.)
(B. Dr.)
To Toms
Ped.

21 22 23 24 25

26

Fl. 1
Fl. 2
Ob. 1.2
Cl. in B♭ 1
Cl. in B♭ 2
Bsn 1.2
Hn in F 1.2
Tpt in C 1 2
Tbn. 1 2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I
Vln II
Vla
Vc.
D. B.

To Picc.
Picc.
E♭ to E♮
(Glock.)
To Tam.
(Toms)
(B. Dr.)
F♭ A♮ C♯
pizz.
arco

26 27 28 29 30

expansive, terrifyingly vast (♩ = c. 60)

31 D

Fl. 1 · Picc. · Ob. 1 · Ob. 2 · Cl. in B♭ 1 2 · Bsn 1 2 · Hn in F 1 2 · Tpt in C 1 · Tpt in C 2 · Tbn. 1 2 · Tba · Timp. · Perc. 1 · Perc. 2 · Perc. 3 · Hp · Pno

(Tam.) (Toms) (B. Dr.) · Vib. with bow · Tam. · To Toms · Ss. · Glock. · To Vib. · flz. · rapid gliss. · rattle bass wires · Ped.

Vln I 1 2 · Vln II 1 2 · Vla · Vc. · D. B.

31 32 33 34 35 36 37

38

Fl. 1
Picc.
Ob. 1.2
Cl. in B♭ 1.2
Bsn 1.2
Hn in F 1.2
Tpt in C 1
Tpt in C 2
Tbn. 1.2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I 1
Vln I 2
Vln II 1
Vln II 2
Vla
Vc.
D. B.

pp
p
1. pp
2. pp
1. pp +
A♭ to G♭
ppp
(Glock.)
(Vib.)
with bow
pp sparkling
sim.
(B. Dr.)
Ped.
f
8va
sul D

38 39 40 41 42

43

E

Fl. 1
Picc.
Ob. 1
Ob. 2
Cl. in B♭ 1
2
Bsn 1.2
Hn in F 1
2
Tpt in C 1
Tpt in C 2
Tbn. 1.2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I 1
2
Vln II 1
2
Vla
Vc.
D. B.

1.
2.
timbre
flz.
To Tam.
To Glock.
To Tam.
(Vib.)
(Ped.)
(B. Dr.)
with mallet
sim.
D♯
(8)

43 44 45 46 47 48 49

50

F

Fl. 1
Picc.
Ob. 1.2
Cl. in B♭ 1.2
Bsn 1.2
Hn in F 1.2
Tpt in C 1 2
Tbn. 1 2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I 1 2
Vln II 1 2
Vla
Vc.
D. B.

(Tam.)
(Vib.)
(B. Dr.)
Tam.
To Toms
sul D
sparkling

50 51 52 53 54 55

56

Fl. 1
Picc.
To Fl.
Ob. 1
timbre
Ob. 2
timbre
Cl. in B♭ 1.2
flz.
flz.
flz.
Bsn 1.2
Hn in F 1 2
1.
2.
Tpt in C 1 2
Tbn. 1.2
Tba
Timp.
(Glock.)
(Tam.)
Perc. 1
(Ss.)
(Tom.)
To Vib.
Perc. 2
(B. Dr.)
Perc. 3
Hp
E♯ F♯ A♭ D♭ B♭
G♯
E♮ A♮ B♮ D♮
Pno
Ped.
stagger bowings
sul A
sul E
sul A
Vln I 1 2
Vln II 1 2
Vla
Vc.
D. B.

56 57 58 59 60 61 62 63

64

G

Fl. 1
Fl. 2
Ob. 1.2
Cl. in B♭ 1.2
Bsn 1.2
Hn in F 1 2
Tpt in C 1 2
Tbn. 1 2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I 1 2
Vln II 1 2
Vla
Vc.
D. B.

pp
p
1.
ppp
mp
(Tam.)
Tam. with bow
To W. Bl.
W. Bl.
Vib.
with bow
(B. Dr.)
To Sn. Dr.
indistinct, freely
Ped.
(Ped.)
unis.
stagger bowings
sul A
sul D
pizz.

64 65 66 67 68 69 70

71

H

Fl. 1
Fl. 2
Ob. 1.2
Cl. in B♭ 1.2
Bsn 1.2
Hn in F 1 2
Tpt in C 1 2
Tbn. 1.2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I
Vln II 1 2
Vla
Vc.
D. B.

(W. Bl.)
(Vib.)
(Ped.)
(Sn. Dr.)
Sn. Dr.
Fl.
pizz.
arco

71 72 73 74 75 76 77

78

I

Fl. 1

To Picc.

Picc.

Picc.

Ob. 1

Ob. 2

Cl. in B♭ 1.2

Bsn 1.2

Hn in F 1 2

Tpt in C 1 2

Tbn. 1.2

Tba

Timp.

(W. Bl.)

Perc. 1

(Vib.)

Perc. 2

(Ped.)

(Sn. Dr.)

Perc. 3

Hp

Pno

Vln I 1 2

Vln II 1 2

Vla

Vc.

D. B.

arco

pizz.

arco

78 79 80 81 82

83

Fl. 1
Picc.
Ob. 1
Ob. 2
Cl. in B♭ 1 2
Bsn 1.2
Hn in F 1 2
Tpt in C 1 2
Tbn. 1.2
Tba
Timp.
(W. Bl.)
Perc. 1
(Vib.)
Perc. 2
(Sn. Dr.)
Perc. 3
Hp
Pno
Vln I 1
2
Vln II 1
2
Vla
Vc.
D. B.

86 J allarg. accel. holding back

Fl. 1
Picc.
Ob. 1.2
Cl. in B♭ 1 2
Bsn 1.2
Hn in F 1 2
Tpt in C 1 2
Tbn. 1.2
Tba
Timp.
(W. Bl.)
Perc. 1
To Tam.
(Vib.)
Perc. 2
with bow
To Toms
Ped.
(Sn. Dr.) To B. Dr.
Perc. 3
Hp
Pno
Vln I 1 2
Vln II 1 2
Vla
Vc.
D. B.

86 87 88 89 90 91 92 93 94

95 **K** **a tempo, exultant** (♩ = c. 60) **pulsing, brilliant** (♩ = c. 86)

Fl. 1
Picc.
Ob. 1
Ob. 2
Cl. in B♭ 1 2
Bsn 1.2
Hn in F 1.2
Tpt in C 1 2
Tbn. 1 2
Tba
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I 1 2
Vln II 1 2
Vla
Vc.
D. B.

timbre
flz.
To Glock.
Glock.
Tam.
(Vib.)
(W. Bl.)
(B. Dr.)
unis.

95 96 97 98 99 100

101 L

Fl. 1
Picc.
Ob. 1.2
Cl. in B♭ 1 2
Bsn 1 2
Hn in F 1.2
Tpt in C 1 2
Tbn. 1 2
Tba
Timp.
Perc. 1
Perc. 2
Perc. 3
Hp
Pno
Vln I 1 2
Vln II
Vla
Vc.
D. B.

a 2
1.
(Glock.)
(Vib.)
Ped.
(B. Dr.)

101 102 103 104 105