

Basic Astrophysics Equations Discussed

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At the discussion group meeting on Saturday night, April 19, Vice President Bill Winkler presented a talk on the seven basic equations of astrophysics. He said they had been presented by Dr. Donald Limber of Yerkes Observatory in an "Introduction to Astrophysics" course at the University of Chicago in 1965. We are presenting them here for those who are interested or for students who may be studying astrophysics.

$$\begin{array}{lll}
 1. \frac{dM(r)}{dr} = 4\pi r^2 \rho & 3. \frac{dL(r)}{dr} = 4\pi r^2 \epsilon(r) \rho(r) & 5. P = \frac{k}{\mu m_0} \rho T + \frac{1}{2} a T^4 \\
 2. \frac{dP(r)}{dr} = -G \frac{M(r) \rho(r)}{r^2} & 4. \frac{dT(r)}{dr} = -\frac{3k \rho(r)}{4 a c^2} \frac{L(r)}{4\pi r^2} & 6. k = f(P, T, X) \\
 & 7. \epsilon = f(P, T, X)
 \end{array}$$

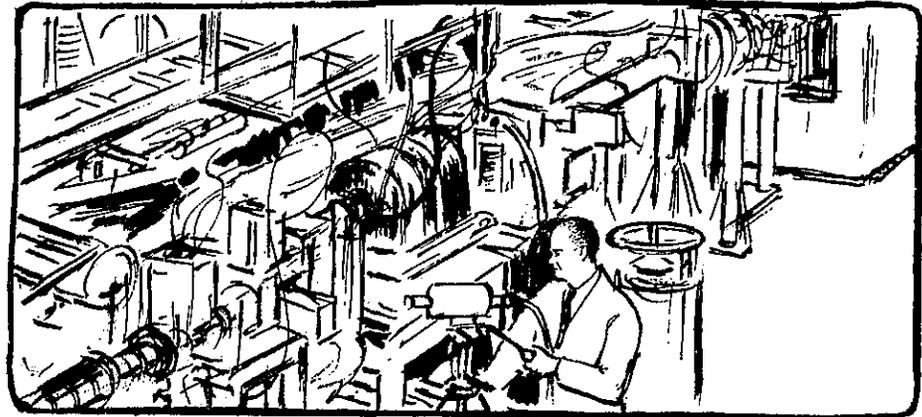
Where: d is a differential; M is mass; f means function of; r is radius outward from star center; (r) is a function of r ; ρ is pressure; L is luminosity; ρ is density; T is temperature; a is the Stefan-Boltzmann Constant; G is the gravitational constant; ϵ is rate of release of thermonuclear energy; μ is mean molecular weight; m_0 is in A.M.U.; k is Rossing mean absorption coefficient; X is opacity.

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STAR DUST



MAY, 1969 ... VOL. XXVI · NO. 9



Dr. John A. Eisele with Navy Research Laboratory Accelerator

Navy Scientist To Talk On Space-Probe Mechanics

Space-travel mechanics will be the subject of the lecture at the May 3 meeting when Dr. John A. Eisele of the Cyclotron Branch, Naval Research Laboratory, will talk on "Basic Principles of Rockets, Satellites and Space Travel." His talk will cover Newton's and Kepler's laws and their applications to rockets, satellites sub-orbital and orbital motion. Thus, we are being offered an excellent opportunity to review (or discover) the most important elements of celestial mechanics.

Dr. Eisele received his Ph.D. from Ohio State in 1959. Since 1965, he has been a nuclear physicist with the NRL cyclotron branch, and previously held professorships in physics and astronomy at Southern Illinois and Texas A and M Universities. In addition, Dr. Eisele owns the National Book Company of America and was an NSF post-doctoral fellow in 1959.

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 *George E. Gould, president.

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SPACE corner

Of UFOs, The Condon Report, Folk Lore and Satellites -AN EDITOR'S VIEWS

There have been some magazine article discussions, mainly regarding the Condon UFO report. One of the most argued points in these articles was the validity of Mr. Condon's assertion that science is not advanced by a study of the various reports.

If the editor may comment, I quite agree with this assertion, so far as the present mode and scope of physical science is concerned. For the implications of these objects run more over into the realm of philosophy than physical science as such.

But if we are defining science as "knowledge," as in the Webster Collegiate first definition, and not solely as the fourth: "A branch of study concerned with observations and classification of facts, esp. with the establishment of verifiable general laws," etc., we could accept the broader latitude offered by philosophy.

Knowledge, philosophy and science might then all be grouped under "Truth," ideally. And though emotion should perhaps not interfere, joy might be found in the establishment of truth, even if it upsets old, comfortable beliefs. We could, in this regard, perhaps strive more to avoid premature crystallization of our ideas and concepts.

UFO REPORTED

Well, at press time there haven't been any reports on this desk about specific observations. The only one in the general area to come to our notice was an object reported over the Putty Hill area in Baltimore Saturday night, March 22. It was described as being orange-colored with flashing lights. Some saw it when it was not luminous but showed a "cigar shape." Still others called it a "big ball of fire." The reports ranged over about an hour. Some residents said it resembled "a spinning beach ball with an object on top."

Whatever it was, it elicited the usual excitement; not many hard facts, though, as of elevation, direction or angular diameter. So we are left with only our speculations regarding, perhaps, other civilizations, technologies and philosophies so far advanced their feats would appear as magic to us. And as in some science fiction, they might control matter and extend it to another phase of energy capable of instant transfer outside our concepts of space, time and the light-speed constant.

This would seem magic to us, as much as our own achievements to a primitive or our forefathers as little as a century ago. (A physics teacher "proved" to us mathematically why it is "impossible" for anything to escape the earth's gravity.)

Truth is not only dangerous and unpopular, it's often enigmatic. Some of the old, despised folklore has a disturbing way of vindicating itself, as in old cures which prove their worth, then are synthesized.

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CALENDAR

MAY

- 3, 6:15 PM Dinner with Dr. John Eisele at Bassin's Restaurant, 14th and Pennsylvania Ave., N.W. Everyone welcome. (No reservations needed.)
- 8:15 PM May meeting of NCA at Dept. of Commerce Bldg. Auditorium, 14th and E St., N.W.
- 9, 9-11 PM Five-inch telescope observing at the Naval Observatory, Building 25; John Alexio will be in charge. (Members are asked by the Navy not to enter any other than the main building, for registering, and Bldg. 25 -- and to sign out when leaving.)
- 11, 2 PM Prince Georges' Juniors meeting at Materials Center. Please bring Messier drawings.
- 16, 9-11PM Five-inch telescope observing at Naval Observatory. Larry White will be in charge. (Please see above.)
- 17, 8:15PM Discussion group, Room 2063, Dept. of Commerce Bldg. Auditorium, 14th and Pennsylvania Ave. (Subject to be announced.)

TELESCOPE MAKING CLASSES: Tuesday nights: Materials Center, Bladensburg, Md.; Ted Noble, inst.; 779-7946.

FRIDAY NIGHTS: Palisades Community Center, D.C. Jerry Schnall, inst. (h.) EM 2-8872; (off.) 557-3144.



FINANCIAL STATEMENT: CASH INCOME AND OUTGO: MARCH, 1969

INCOME			
Dues	\$17.00	Star Dust	\$4.81
Observer Handbooks (1)	1.00	Special Bulletin	3.87
		Sky and Telescope	2.00
		Scientific Res. Dir.	5.00
Total Income, March	18.00	Books for Observ. Comm:	
Total Outgo, March	37.93	Norton's Atlas	5.00
Balance 2-28-69	563.63	Atlas of Heavens	2.80
T O T A L	581.63	Book (to be sold)	8.05
Less outgo, March	37.93	Speakers' dinners, (2)	6.50
BALANCE, March 31, 1969	543.70	Total outgo, March	37.93

April 7, 1969; Jerome Schnall, Treas.

(Please remember to pay your dues... J.S.)

(Some of the old-time members will be interested to know that Harold Seielstad sent in his dues from 10 Prince Royal Passage, Corte Madera, California, 94925. Thanks and greetings!)

"NCA" Name Receives Unanimous Vote

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At the April meeting a unanimous vote by the members present gave formal sanction to the action for legalizing our name as The National Capital Astrcnomers.

The name is legally filed as National Capital Astrcnomers Inc., but we will call ourselves simply by the three-word name, substantially simplifying it from the original name: The National Capital Amateur Astrcnomers' Association. The new name was officially filed as of Tuesday, April 22, by Mr. Worth Crowley; George Gould and Thelma Cressy, acting secretary, signed for the NCA.

The statement of the election to accept was worded: "We elect to change the name from 'The National... (etc.)' to 'National Capital Astrcnomers, Inc.'" According to Mr. Crowley, a retired attorney who did the legal review and writing of the papers, the statement of incorporation has the same purposes as before. They are listed as: "The particular business and objects of said corporation shall be the education and mutual improvement of its members in the science of Astronomy and the encouragement of an interest in this science, among others."

Jerome Schnell, NCA treasurer, has agreed to act as our registered agent in the District of Columbia.

April Speaker Describes Sun Emissions



Mr. John Meekins, of the Space Research group at NRL (Naval Research Laboratory) gave a detailed discussion of X-ray emission from solar flares, as measured by rocket flights and the Orbiting Solar Observatories. The latter have just recently made possible the precise location of X-ray sources on the solar disk. Mr. Meekins stressed that we have no all-encompassing model of what a solar flare is.

NEW MEMBERS

Regular: Leo E. Menestrina, 612 Ellsworth Drive, Silver Spring, Md. 20910. James A. Schein, 6202 Ridge Drive, Brookmont, Md. 20016, 229-2075. JUNIORS: Bruce Chandler, 5980 Seabright Road, Springfield, Va. 22150; Steven Homann, 8206 Donset Drive, Springfield, Va. 22150; Robert Kissinger, 1248 Cresthaven Drive, Silver Spring, Md., 20903; David Williams, 6405 Tone Drive, Bethesda, Md., 20034. OL2-8187; Robert P. Shephard, 6821 Winter Lane, Annandale, Va. 22003, 354-8387.

"SPACE," cont.

"Wrong-way Satellites"

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By the way, I wasn't joking last time about "wrong-way satellites." We experienced a couple of these in Connecticut and earlier in Minnesota. One theory was that they might be secret Russian devices, perhaps failures. But a writer in the popular men's magazine, *Saga*, last December, purported to identify at least some of these as "mother ships," from which smaller craft ejected, seen by radar.

The sizes of these craft were computed, by speed and altitude, in the ten cases noted, and dwarf even the biggest of the Russian satellites, according to the author. The one we saw in Minnesota was going in roughly a northerly course, intersecting one of the U.S. objects' orbits. The other I didn't see, but had a chance to report on when working on the night desk of New Haven's morning paper, the *Journal-Courier*. We received about six or so calls that night in 1961, when many were out watching one of our early orbiters.

STAR DUST—Actual and Journalistic



A newspaper article reported recently that the legendary stardust, our journal's namesake, has been found, by a team of Minnesota astrophysicists, to be chemically allied to beach sand. That is, "varied proportions of metal oxides and silicon dioxide chemically bound together." These elements were found in the matter and gas between stars as well in the infrared frequencies of the stars themselves -- both young and old.

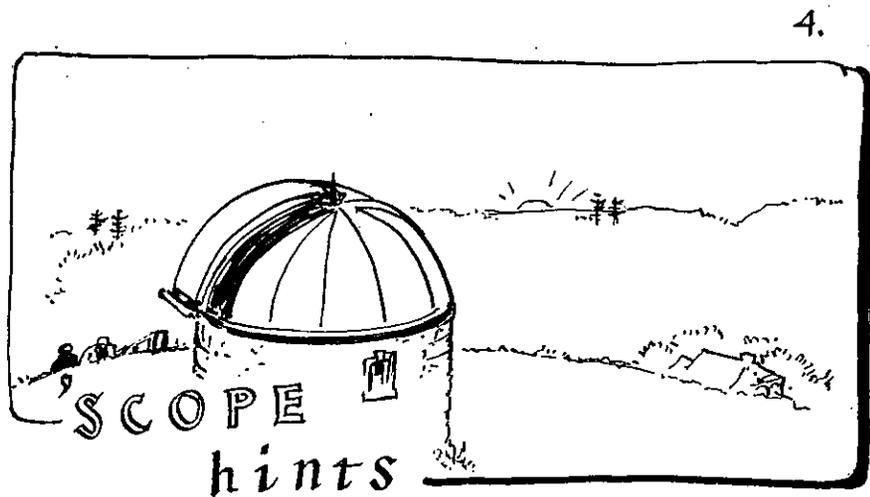
Be that as it may, *Star Dust*, our journal, according to Mabel Sterns, who named and started it in October, 1944, first appeared in mimeograph form, when NCA (AA) was beginning its seventh year. She says there were then 40 members and there was \$227.40 in the treasury at that time.

The following year, Bob McCracken, pres., thought it should be spruced up and it was put out in offset form with the first art work, on the first page.

The journal was meant to report news of astronomical interest in the Washington area, with reports of committees, lists of members, books at the library, conventions of the national Astronomical League, etc. For a time, the Juniors had a page of their own. And an attempt has been made to keep it to four pages.

With the next issue, we hope the previous editor, Dr. John Legowik will have returned from San Antonio and will be able to take over again, with perhaps some assistance from your present, acting editor. Despite the occasional anxieties and unavoidable errors, it has been an enjoyable experience and would have been moreso, but for the "Ideas of April," car inspections, repairs and all the usual April distractions which, for a while, made it uncertain that we'd be able to get this out in time. (It could still be.) By the way, please let us know what your feelings are about keeping it down to four pages, if you have a preference. Thanks! D.N.

PLEASE CUT AT FOLD FOR CORRECT SEQUENCE & BINDING

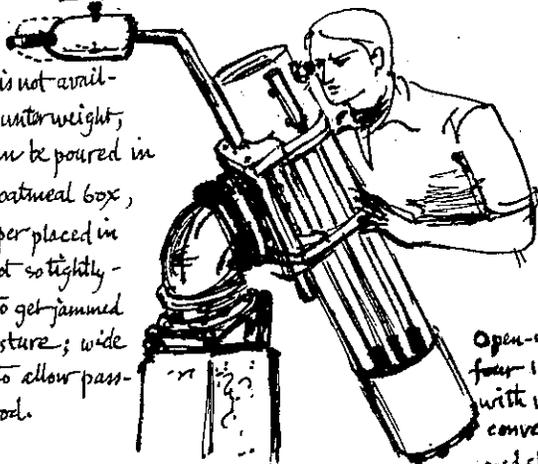


POOR MAN'S TELESCOPE

(Some suggestions for economizing designers.)

Wing bolt allows
balance adjustment

If cement is not available for counterweight, plaster can be poured in tin or in oatmeal box, rolled paper placed in center - not so tightly-rolled as to get jammed from moisture; wide enough to allow passage of rod.



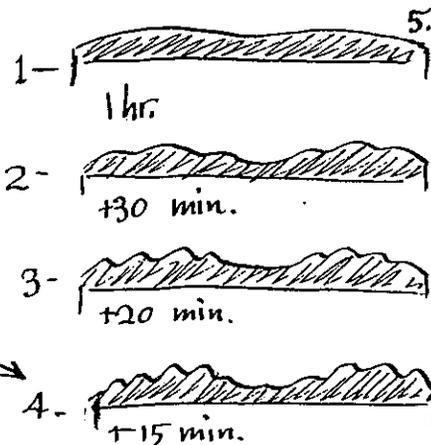
SIX-INCH pipe fittings -

A variation on the Spring-field mount. Smoothing threads with carborundum may not eliminate all racking due to imperfect contact, but broad fittings are better than the thin "India-rubber" variety.

Open-work tube of two 2x4s and four 1x2s, covered top and bottom with rolled metal - an answer to convection currents, giving steadier and sharper image

Foucault Test -
apparent sections.

(Thanks to Royal English,
expert on optical flats.)



Time to add a couple of tea-spoons of pine tar to a too-hard pitch lap. But beware of turned-down edge from too soft a lap, hyperbolas, etc. Pine tar, available from country stores, was discovered as a good softener by English during the war.

