

THE

# SPECTRUM

JANUARY 1968

BUFFALO ASTRONOMICAL ASSOCIATION INC.  
BUFFALO MUSEUM OF SCIENCE  
HUMBOLDT PARKWAY  
BUFFALO NEW YORK 14211

JANUARY MEETING: Our first meeting of the new year will take place on January 12, 1968 at 8:00 PM at the Museum. Featured will be Mr. Ray Manners of Bell Aerosystems with an illustrated lecture entitled A NEW THEORY OF THE SOLAR SYSTEM. Mr. Manners is well-remembered by our members for his lecture on manned lunar exploration and his excellent discussion of meteor observation at last year's convention. He is a Fellow of the Royal Astronomical Society of England. This promises to be a thought-provoking program and we are happy to welcome back RAY MANNERS!

\* \* \* \*

\* OBJECTIVES BY PAULY.\* By Ernst E. Both (Conclusion).

Pauly designed his own grinding tools, enlisting the aid of two engineers from his sugar factory, August Schäfer and Karl Tauchnitz. Not satisfied with "standard" procedures, Pauly developed his own methods of grinding and polishing as well as testing the figure of his lenses. He tried to approach the theoretical figure as closely as humanly possible and we have the testimony of Max Wolf that extrafocal images of Pauly objectives were exceptionally free of zones. From about 1886 to 1896 Pauly made a large number of objectives which he literally gave away to serious amateurs or professional observatories for little or no compensation. Some of these were mounted by G. Meissner of Berlin (Fauth's 6.5 inch refractor, for example). In 1895 Pauly constructed a polishing machine which could handle objectives as large as 24 inches.

I do not know just how many objectives Pauly produced during this time. An 8-inch was made for his own observatory in 1888 and mounted according to plans by Nikolaus von Konkoly (founder and director of the O'Gyalla Observatory in Hungary) in the early 1890's. A 6-inch went to a Mr. Grinenko, and a similar one to Fauth as already mentioned (apparently the objective was given to Fauth who contracted with G. Meissner for the rest of the instrument). Between 1891 and 1894 Pauly experimented with apochromates (triple objectives which eliminate secondary spectrum) made from a new kind of glass developed by Otto Schott. A 7-inch apochromate went to the Jena Observatory, another one to Fauth and one of six inches aperture to the Urania Observatory in Berlin.

Pauly's reputation as an optical craftsman grew steadily, and it was only natural that Ernst Abbe turned to him when the firm of Carl Zeiss in Jena organized an astronomical instrument department in 1897. Pauly became its director and he

brought with him to Jena his assistants Schäfer and Tauchnitz. Later he added to his staff the mathematicians Hans Harting and Albert König, the astronomer Walter Villiger (1902) and the engineer Franz Meyer (1903) who was mainly responsible for the many improvements in mounting design which characterized the Zeiss telescopes of this first period. From the time Pauly assumed his new position until he resigned in 1913, the firm of Carl Zeiss established a solid reputation in astronomical instruments and astronomy in Germany went through a period of rejuvenation as a long stream of fairly large instruments left the Zeiss factory. Among instruments completed under the direction of Pauly we may mention the following: triple refractor for the Simeis Observatory, 150-120-120 mm (1900-04); 720 mm reflector and 250 mm refractor for Max Wolf at the Königsstuhl/Heidelberg Observatory (1901-04); 400 mm reflector Innsbruck Observatory (1903-05); 1000 mm reflector Hamburg-Bergedorf Observatory (1908-11); 360 mm photographic triplet refractor Neuchatel Observatory (1908-10); 300 mm objective for the Urania Observatory in Berlin (1908-11); 350 mm and 300 mm objectives for the Zürich Observatory (1908-11); 340 mm astrograph for Hamburg-Bergedorf (1909-11); 650 mm refractor for the Berlin-Babelsberg Observatory (1911-14) and a 1200 mm reflector for the same institution, which, however, was not delivered until 1920 because of the war.

Pauly left Zeiss in 1913 to devote the remainder of his life to his family and his studies in chemistry. He died April 26, 1917. The reputation of the firm of Carl Zeiss as a producer of first-rate astronomical instruments rests largely on the beginning successes engineered by Pauly and his staff. Pauly's objectives achieved a level of perfection rivalled by no one at the time.

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#### \* CORRECTION \*

We are very sorry that a typing error destroyed the meaning of a sentence in Ed Lindberg's fine article in the December 1967 issue. On page 2, the first complete sentence should read: "This is also the direction of the Galactic Pole near Coma Berenices and gives us a clear view out of our galaxy." eeb.

\* \*

#### BOOK REVIEW:

STARS AND PLANETS, by James Muirden. Thomas Y. Crowell Publisher, New York, N.Y. 1964, 318 pages; \* Reviewed by Richard S. Zygmunt

Most books written recently about astronomy are crammed with much technical information so that their objective, to interest young readers, is lost in mathematical equations and technical terms. Stars and Planets, as the title implies, is devoted to the understanding of not only the solar system and stellar universe, but also lists objects of interest to amateur observers. The text can be fully appreciated by young adults because of its simplicity and minimum of technical terms yet it implies the thoroughness of an avid amateur astronomer.

The first of three parts in which the book is arranged deals with the nearer celestial objects, i.e. the Sun and its retinue of nine planets. Here, the author places the Sun into its proper majestic position when he refers to "Mother Sun" rather than the more commonly used term "Mother Earth," since without the energy of the Sun there would be no life on Earth. He also describes man's very insignificant role in this mighty universe by proportionally scaling down its size to one that is more easily imaginable.

The Milky Way with its myriads of stars is categorized into single stars, binary stars, optical doubles, variables, novae and supernovae. The book also describes the Galaxy, globular clusters, star clouds, external galaxies and the theories involving the evolution of the universe. The last part of the book is devoted to enticing young people to consider astronomy as an avocation. There is much valuable work that can be done by the serious amateur with modest equipment, the main requirements being patience and persistence. The author states that both satellite galaxies of M 31 can be seen with a 3" refractor, but I have observed the Andromeda galaxy with a 3.3" refractor under nearly ideal conditions and could not identify the satellites. (See note below). On the whole the book is factual, precise and deserves a space on the shelves of interested amateurs.

EDITORIAL NOTE: Both satellites of M 31 (NGC 221 = M 32, and NGC 205) have an apparent visual magnitude of about +8, so that they are well within the limit of a three inch refractor. However, they certainly will not look much different from a faint star. Most popular books will make statements to the effect that you "can SEE such and such an object with your telescope" which immediately invokes in the novice's mind a picture similar to a photograph taken with the 200-inch! This is deplorable but apparently little can be done about it. In most other fields I suppose one could sue for false advertising. eeb.

\* \* \*

\* CERRO TOLOLO OBSERVATORY IN CHILE.\* Reported by Kurt Erland.

During November 1967 the Cerro Tololo Observatory in north central Chile was formally dedicated. This new observatory is operated by AURA, the Association of Universities for Research in Astronomy, the same organization which operates our Kitt Peak National Observatory near Tucson, Arizona. Cerro Tololo is located about 50 miles southeast of La Serena and some 310 miles north of Santiago, nearly 60° latitude difference from Kitt Peak.

At present five observatory domes adorn Cerro Tololo at an altitude of 7,300 ft., housing reflectors of 60-inch, 36-inch, and two 16-inch apertures as well as a 24-inch Schmidt camera on loan from the University of Michigan (the latter is the H.D. Curtis telescope). A 150-inch reflector will go under construction soon and will be a nearly identical twin to the one projected for Kitt Peak (on the Kitt Peak instrument see Sky and Telescope for May, 1965, pp. 268-273).

Cerro Tololo will be the nucleus of a complex of astronomical facilities in Chile. The European Southern Observatory under Dr. Otto Heckmann plans an instrument in the 120-inch range for its site at La Silla, 62 miles south of it; the Carnegie Southern Observatory is considering a 200-inch reflector (a duplicate of the Hale telescope) for a site at Cerro Morado, 4½ miles south of Cerro Tololo; and the USSR is erecting a 40-inch Maksutov telescope on top of Cerro Robles, about 100 miles north of Santiago. Cerro Tololo is headed by Dr. Victor M. Blanco, formerly with the US Naval Observatory; Dr. Blanco is an authority on red stars and infrared astronomy.

POSTSCRIPT: As we go to press there is a story out that His Majesty King Faisal of Saudi Arabia is planning a major astronomical facility, with a reflector in the 100-inch range. The British Astronomer Royal, Sir Richard Wooley, is to act as a consultant. When asked to comment, Sir Richard had this statement to make: "The trouble may be sand storms ... It is no use at all spending millions of dollars on big telescopes if they will be blinded and probably damaged by sand and grit. Even a bottomless budget can't solve that."

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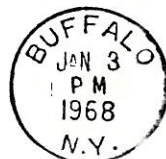


\* SPY AND TELL \*: The Reddings (Mr. & Mrs. BAA Treasurer) have added a little Irish Setter to their household ... \* \* \* ... Had a pleasant but short chat with Robert Burdick of Eden, N.Y., one of our visitors (and hopefully new member) at our X-mas meeting - Mr. Burdick has a 12-inch Dall-Kirkham and a 4" Baker triplet. He certainly has the skies for that kind of instrumentation ... \*\*\* ... Rudy Buecking tells us that he finished his 6-inch rich field and is just about done with his 5 $\frac{1}{4}$  inch Schiefspiegler. Hope you'll let us know more about that German contraption, Rudy! ... \* \* \* ... Charles Ware, one of our younger members finally broke down and (GET THIS!) ordered a new mirror from Optical Craftsmen for his 8-inch, f/9 reflector - from what we have seen of Mr. Ware's lunar and planetary observations, his own mirror wasn't too bad. Imagine, buying a mirror! ... \*\*\* ... Margaret Rabe has dropped out of the ranks of the active observers, sold her refractor - or are you going to turn traitor and get a reflector, Margaret? ... \* \* \* ... Dick Zygmunt is busy at work on a short-wave receiver for the Kellogg Observatory - at long last, we'll be able to tell time (?) ... \*\*\* ... Rumor has it that Walt Semerau is giving up instrument making in favor of gem-cutting! But like all rumors, this one is only that (Thank Goodness!) ... \* \* \* ... Someone's office piled to the ceiling with (would you believe it?) dried mushrooms. Some sort of extra-curricular activity, we assume ... \*\*\* ... This one comes from our president: Science teacher: Now that we have discussed the reasons for lunar eclipses, I want you all to remember to ask your parents' permission to stay up late and watch the eclipse this evening beginning at 10 o'clock. Science student: Oh good! What channel is it on? - Oh well!

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PLEASE: Let us know what you would like to see or read in your SPECTRUM. And if you have anything you'd like to share with your fellow members, let us know.

H A P P Y   N E W   Y E A R



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# SOLAR INFLUENCE ON THE LOWER IONOSPHERIC TRANSMISSION OF HIGH FREQUENCY RADIO WAVES

Orrin D. Christy

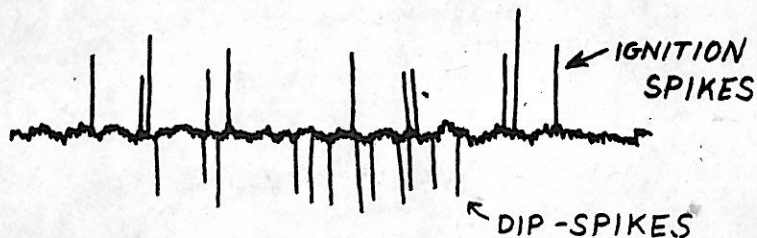
Canisius College

January, 1968

**Theorem:** There is a particular type of short lived ionization in a layer of the ionosphere 45 miles above the earth, which effects the transmission of high frequency radio waves through it, and is directly dependent on the relative sunspot number.

While investigating the radio structure of the galactic nucleus with a sixteen foot parabolic dish, a strange type of interference was found which when compared with the AAVSO relative sunspot number, directly corresponded. This was found to be a loss in signal strength, particularly only that component of the signal originating from extraterrestrial sources. It was not just a scintillation effect, but a significant canceling of the extraterrestrial component.

On the charts, these looked like little spikes and were a reduction in signal strength, so the phrase, dip-spike, was coined. Ignition spikes rose from the graph and were essentially the short lived increase due to automobile ignition noise.

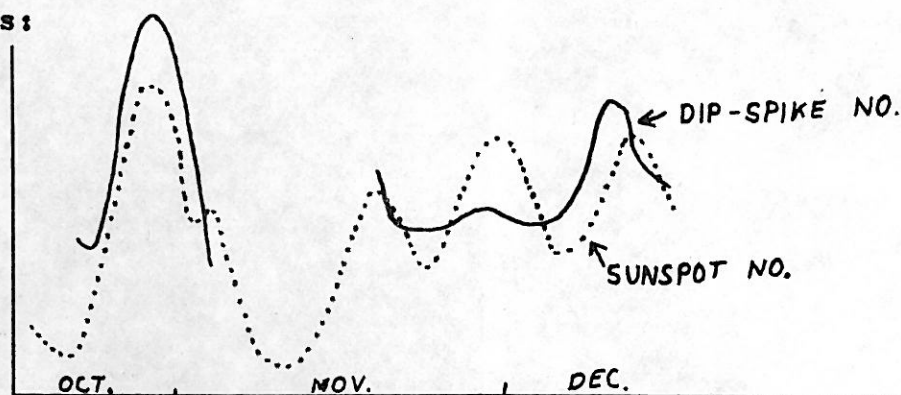


Most studies of the ionosphere are done by using earth-bound transmitters, but in this study, the low power levels of extraterrestrial radio noise were utilized as the transmitter outside the ionosphere. The short life of this ionization makes it fairly unique, and no account of this was found in contemporary journals.

**Observations:** 62 days  
1338 hours  
Made with 16 foot parabolic dish, BC1161A  
radar receiver at 162 Mc, and a 0 to 50 volt  
chart recorder.



# Results:



An approximate graph of the observations of the daily dip-spike number and the relative sunspot number. The gap in the dip spike number was when equipment was out for testing.

## EVIDENCE

- 1) Direct correlation of daily dip-spike number and the daily relative sunspot number.
- 2) No correlation with weather or meteors or terrestrial activity periods
- 3) Random distribution through the day and complete absence at night
- 4) None were found in two weeks, when the antenna was disconnected from the equipment
- 5) The noise level drops off to a constant level
- 6) As the altitude of the antenna was raised to 90°, in periods of high activity on the sun, the dipspikes were reduced
- 7) Short duration, long distance contacts of 7 to 14 seconds on high frequencies which corresponded with dip-spikes
- 8) Delay in first occurrence after sunrise
- 9) Delay in last occurrence after sunset of 24 minutes

## INFERENCE

Correlation with Sunspots

Extraterrestrial causes

Sun must be in a position above the horizon for this refraction to occur

Cause of dip-spikes not in equipment

Extraterrestrial component only is effected

Ionospheric layer refracts the waves back into space on low altitude observations

Duration of the ionization is about 10 seconds

Atmosphere is dense at the altitude observed

Altitude of layer is 45 miles