



GUGLIELMO RIGHINI (1908-1978)

## In Memoriam

### GUGLIELMO RIGHINI

(1908–1978)

These lines are written to honour the memory of a very dear friend and one of the most eminent scientists in solar physics, Guglielmo Righini, Director during the last twenty-five years of the Astrophysical Observatory of Arcetri and Member, since its foundation, of the Editorial Board of this journal, who died on May 29, 1978. It was an unexpected and irreparable loss for the people who loved him and admired his high scientific talent and human qualities.

Guglielmo Righini was born on February 16, 1908 in Castelfranco Veneto, but he went early with his family to Florence, where he followed the technical schools and later the University, obtaining in 1930 the degree of Doctor in Physics. He was already working, since 1928, at the Arcetri Observatory, under the guidance of Professor Giorgio Abetti, and there he remained after graduation, having brilliantly obtained a position of astronomer in the same Institute.

Arcetri was at that time the unique centre in Italy of solar physics and so it was natural that Righini should be deeply interested, since the beginning of his astronomical career, in studies of the Sun and related problems, particularly spectroscopy. Some of his earlier publications, from 1930 to 1935, concern in fact the solar rotation, the profile of the magnesium triplet and, more in general, the form and intensities of lines in the solar spectrum. In 1934, after his military service, Righini had the opportunity to go to Utrecht, with a grant of the Rockefeller Foundation, to work in the fields of theoretical and experimental spectroscopy. His intelligent activity was greatly appreciated by Professor Minnaert, with whom he remained since then in terms of sincere friendship. Back to Arcetri, Righini took care of the preparation of the instruments, at home and then at Orenburgh in Siberia, for the observation of the total solar eclipse of June 19, 1936. The expedition, directed by Professor Abetti, was successful. Righini was particularly interested in the solar corona and obtained a number of plates which he examined from the photometric and spectroscopic point of view, with significant results. This was his first experience in the observation of solar eclipses; in later years he took part in seven other expeditions, observing total eclipses of Sun from the ground and from aircrafts, becoming one of the most experienced scientists in this field.

Righini was extremely skilful not only in experimental and observational work, but also in the theoretical analysis and interpretation of the results. So, although the working conditions were very difficult during the war, he was able to devise and construct instruments for the optical integration of spectral lines, while at the same time examining from the theoretical point of view the structure of their profiles. During these years he published a series of papers on the physical conditions of the

solar corona, the intensity distribution of its continuous spectrum, its color index and temperature, again on the basis of observational and theoretical considerations.

After the war, when communications with other countries became again possible, Righini went to Cambridge, with a grant of the British Council, in order to be introduced in the new methods of solar radioastronomy. His scientific activity between 1945 and 1951 was extremely intense, practically in all fields of solar physics, but in particular in laboratory spectroscopy and instrumental techniques.

In 1951 he was appointed acting Director of the Asiago Astrophysical Observatory. The new telescope of 122 cm, at that time the largest in Europe, had been scarcely used during the war. With the wide experience acquired in solar spectroscopy, Righini was able to give a strong impulse to the research, leading a group of young astronomers in spectroscopic studies of the Be stars. Result of this work was a series of papers on the spectrophotometry and quantitative analysis of the atmospheres of fifteen Be stars and three stars of type B. I should like to quote here, in addition, his study of the infrared spectrum of  $\beta$  Lyrae, a pioneering work in this field.

At the end of 1953 Righini was appointed full professor of Astronomy at the University of Florence and Director of the Arcetri Astrophysical Observatory, as successor of Professor Giorgio Abetti. He returned therefore, and for ever, in the same Observatory where, as a pupil of Professor Abetti, he had begun his astronomical activity. It was a difficult task to continue the work of Giorgio Abetti, who had led the Observatory to a very high degree of efficiency. But Righini fully succeeded in this object. Still following his personal researches, he devoted much time to increase the resources of the Arcetri Observatory, with new instruments, new laboratories, with every kind of facilities apt to maintain the high scientific level of the Institute. At the same time he led the young astronomers to develop new techniques, to face modern problems of solar physics from different perspectives, to extend solar studies in other directions. Radio observations of the Sun were very promising. Righini entered in this field since 1960 and was able to build, in 1963, a parabolic antenna of 10 meters, which was employed for a programme of systematic solar radio observations at wavelength of about 3 cm. Later, the Observatory was equipped with a station for tracking telemetry signals of artificial satellites for solar monitoring in the UV and X-ray bands.

Classical researches were not forgotten, but carried out with new methods. Several expeditions for observing total eclipses of Sun were organized by Righini. In the eclipse of February 15, 1961, when the path of the totality passed over Arcetri, Righini observed the phenomenon aboard a military aircraft, following the shadow of the Moon at high altitude, so to increase, in a perfectly clear sky, the duration of totality. As a recognition of the success of this new technique, he was invited by the National Geographic Society and the Douglas Aircraft Corporation, and later by the NASA, to participate in quality of expert, in the observations from board of jets of the solar eclipses of July 20, 1963 in Canada, on May 30, 1965 in the Southern Pacific, and on November 12, 1966, in Brazil.

Righini was enthusiastic about the use of aircrafts for observations of solar eclipses. In a vivid presentation, in 1965, to the Meeting of the Italian Astronomical Society, after having described in detail the advantages and results obtained by aerial observations he concluded: "My wishes are that such flying laboratories will be more extensively used and that the big aircrafts will be employed in future as instruments of peace for the progress of science and the benefit of humanity". These airborne observations of solar eclipses, carried out by international cooperation, gave some new results, among which I quote here the discovery by Righini and Deutsch of cold regions in the solar corona.

The importance of international cooperation for the progress of solar researches was obvious. So Righini became one of the most active supporters of the Project JOSO (Joint Organisation for Solar Observations) proposed in 1967 by Dr. Kiepenheuer and he participated with his staff of young astronomers in the preliminary studies for the site testing of a large solar Observatory. At the same time, having been appointed President of the Commission for the Italian National Astronomical Observatory (OAN) he took in his hands the whole project and in particular that of the 3.5 meters telescope. He was able, from the beginning, to overcome some bureaucratic obstacles, to gain the support of influential people. In spite of many difficulties, the site of the new Observatory was found, the drawings of the telescope and some optical and mechanical parts were ready. The project was slowly but surely going towards its effective realization, when the death interrupted his work.

Living in Arcetri, the fascinating peaceful place where even now all seems to recall the memory of Galileo, Righini was naturally induced to take an increasing interest in the life and writings of the great man who, with his marvellous observations, gave course to modern Astronomy. Righini was particularly attracted to the analysis and discussion of these observations, which were much more accurate and precise than it was previously believed. So in the last years he published a series of papers concerning Galileo and the history of Astronomy in the galilean period. These papers, and particularly the last "Contributo alla interpretazione scientifica dell'opera astronomica di Galileo" are remarkable for originality, keen critical sense and accuracy. The time of his retirement from the Observatory was approaching and Professor Righini was thinking with delight to dedicate even more of his time to historical researches in the quiet atmosphere of the Museum of Sciences of Florence, directed by his wife Maria Luisa Bonelli, with whom he shared the love for science and its history. Unfortunately this desire was destined to remain a dream.

His high scientific value and wide astronomical culture, his ability and equilibrium, were widely recognized. So, Righini was frequently called to assume charges of great responsibility. He had been for years President of the Italian Astronomical Society, Member of the scientific Committee of the National Council of Researches, President and Vice-President of solar Commissions in the IAU. He was National Member of the Academy of Lincei, the highest cultural Institution in Italy, and of the Academy of XL.

Guglielmo Righini was a person of great human qualities. He was fond of his family, good and loyal with his friends, always ready to help people who made recourse to him, by his teaching and with his experience. His kindness and modesty, the natural distinction of his manners, his healthy optimism and the sense of humour which enabled him to maintain his serenity even in difficult circumstances, together with his superior intellect, made him a charming man.

His memory will live for ever in the mind of all of the people who had the privilege of loving him and be among his friends.

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The complete list of the works of Guglielmo Righini contains 168 publications. We quote here some of his most significant works:

1. 'Sul profilo del tripletto del magnesio nello spettro del Sole', 1930, *Mem. SAIt.* **V**, p. 31.
2. 'Die Intensitäten der Natriumlinien im Sonnenspektrum', 1935, *Z. f. Astrophys.* **10**, 334.
3. 'Température et pression relative des gaz dans un arc électrique', 1935, *Physica* **II**, 585.
4. 'Studio fotometrico della corona nell'eclisse di sole del 19 giugno 1936', 1938, *Memorie della Reale Accademia d'Italia*, Vol. IX, p. 175.
5. 'Lo spettro continuo della corona solare', 1940, *Reale Accademia d'Italia, Rendiconti*, Vol. I, p. 716.
6. 'Profilo vero e strumentale delle righe spettrali', 1941, *Mem. SAIt.* **XIV**, p. 123.
7. 'Sulla temperatura della corona solare', 1941, *Atti del II Congr. dell' UMI*.
8. 'Die intensität des kontinuierlichen Spektrum der Korona und der Koronalinien', 1942, *Z. f. Astrophys.* **21**, 158.
9. 'La radiazione ultravioletta e corpuscolare del Sole', 1945, *Mem. SAIt.* **XVII**, p. 29.
10. *Lezioni di Fisica Solare*, 1950, Univ. Firenze.
11. 'On the Intensities of Ti Lines at Different Points of the Sun's Radius' (with V. Barocas), 1951, *Astrophys. J.* **114**, 443.
12. 'Ricerche statistiche sul ciclo dei flocculi'. Note I and II (with G. Godoli), 1951, *Mem. SAIt.* **XXII**, pp. 3 and 23.
13. 'Ricerche spettrofotometriche sulle stelle Be'. Note I, II, III (with Mannino), 1953, *Mem. SAIt.* **XXIII**, pp. 145, 283, 299.
14. 'L'oscuramento al bordo nel caso di un' atmosfera grigia' (with M. Rigutti), 1953, *Mem. SAIt.* **XXIV**, p. 201.
15. 'Sur la raie 3533 Å de la Couronne solaire', 1953, *Compt. Rend. Acad. Sci.* **237**.
16. 'The Infrared Spectrum of Beta Lyrae', 1954, *Observatory* **74**, 73.
17. 'Studio spettrofotometrico di quindici stelle Be e di tre stelle B', (with G. De Strobel, G. Godoli, G. Mannino, S. Taffara), 1954, *Ric. Scient.* **XXIV**, p. 1393.
18. 'The Abundance of the isotope C<sup>13</sup> in the Sun', 1956, *Mem. Liège XVIII*, 265.
19. 'Ricerche di radioastronomia in Arcetri. Il Radiotelescopio', 1961, *Mem. SAIt.* **XXXI**, p. 389.
20. 'Radiotelescopio per onde centrimetriche', 1962, *Ricerca Scient. Suppl.* **I**, 32.
21. *Solar and Geophysical Phenomena during the Minimum of Solar Activity*, 1963, IQSY Notes, 4.
22. 'An Airborne Observation of the Coronal Spectrum at the Eclipse of July 20, 1963', (with A. J. Deutsch), 1964, *Astrophys. J.* **140**, 313.
23. 'Some Preliminary Results from the Solar Monitoring Satellite NRL 1964 I D obtained at Arcetri Station', (with M. Landini, M. Piattelli, D. Russo, G. L. Tagliaferri), 1964, *Ann. Astrophys.* **27**, 765.
24. *L'aereo come mezzo per osservare le eclissi solari*, 1968, Atti Convegni Astronomici Arcetri e Bologna.
25. 'An optical System for Monochromatic Photography of the Electron Corona', (with K. E. Kissell, C. Morais, A. Righini), 1970, *Appl. Opt.* **IX**, 2620.

26. *The Italian 3.5 m Telescope Project*, (with J. C. Farrell), 1971, Eso-Cern Conference on Large Telescope Design, p. 65.
27. 'Sulla costruzione del Compasso Geometrico e Militare di Galileo', 1974, *Physis* **XVI**, 201.
28. *Galileo e la stella nuova*, 1977, PRISMATA, Wiesbaden, p. 329.
29. 'Il grande astrolabio del Museo di Storia della Scienza di Firenze', 1977, *Annali* **II**, 45.
30. 'Contributo alla interpretazione scientifica dell'opera astronomica di Galileo', 1978, *Annali Museo Scienza Firenze* **III**, 120.