



ELMA PARSAMIAN
Scientific and Pedagogical Activity

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The book summarizes the lifelong scientific and pedagogical activities of Prof. Elma Parsamian, Doctor of Physics and Mathematics, Corresponding Member of the National Academy of Sciences of the Republic of Armenia. This is a detailed overview of E. Parsamian's biographical data, education, main research fields, scientific and popular publications and other information about her. A number of photos of Parsamian together with other famous astronomers and public figures are also included in the book.

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1974

Preface

Elma Parsamian, Doctor of Physical and Mathematical Sciences, Corresponding member of the National Academy of Sciences of the Republic of Armenia, is a devoted Armenian astronomer, who has contributed greatly to the international reputation of the Byurakan Astrophysical Observatory for decades. Various scientific results, hundreds of scientific and popular articles/papers, books, dozens of conferences, invited reports and seminars, dozens of students, editorial and organisational activities, TV and radio programs, publications, meetings, social activities: all these are the fields of Parsamian's activities. If we take into account the fact that Parsamian has done most of the above mentioned in the period when women had limited opportunities in the science and the society in general, then her contribution to the Armenian science becomes even more valuable.

The Byurakan Astrophysical Observatory has become Armenia's visiting card. This is mainly due to its people, the astronomers: first and foremost V. Ambartsumian and his students, like Elma Parsamian. Parsamian always kindly recalls her first meeting and longtime working experience with the great Armenian scientist V. Ambartsumian, being proud of spending the best years of her life with such a great person. After Ambartsumian's death, Elma Parsamian published a book dedicated to him, that contains memories and opinions of many scientists and contemporaries. The book is still up to date as Ambartsumian's scientific heritage is limitless/borderless and has a need for further study. By speaking Parsamian's scientific heritage, firstly her studies of stars and nebulae physics, variable stars, and stellar systems, as well as a number of statistical works that brought important astrophysical results should be mentioned. Nebulae discovered by Parsamian bear her name: Parsamian 1, Parsamian 2 and others (Parsamian 21 being the best-known). One can't help mentioning her extremely important works on revealing, observing and spreading the knowledge of Armenian astronomical heritage. Specifically, her studies of Metsamor observational platforms and Zorats qarer (Karahunge) made them popular. After her studies other professors and archeologists also started to take notice of them.

Parsamian's scientific activity has been covered by Armenian and Soviet press and presented in the radio and TV programs. In 1978, "Armenfilm" movie studio produced a documentary film about Parsamian in Russian, called "Close Stars", which also depicts valuable scenes of the Observatory activities.

The book is dedicated to Professor Elma Parsamian's life and activities: from youth to the period of becoming internationally known scientist. The book is intended for the wide public audience: schoolchildren to scientists, and can be used as an instructive guide by those who want to reach the heights in science.

Areg Mickaelian

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Elma S. Parsamian:

Brief Biography and Scientific-Pedagogical Activity

Many of the first-generation of Armenian students of the world-renowned scientist Viktor Ambartsumian have achieved great success; they have become members of the National Academy of

Sciences of the Republic of Armenia (NAS RA) and of other international scientific organizations. The objects discovered and studied by them have been named in their honor in the world scientific literature. However, few women are among these members, but the principal researcher of the Byurakan Astrophysical Observatory of NAS RA, Doctor of Physical and Mathematical Sciences, Professor Elma Parsamian is the only woman who has reached the mentioned success and has become a corresponding member of NAS RA in Physics. The future scientist was born in Yerevan on December 23, 1929, in the family of a public servant. Her father Suren Mnatsakan Parsamian was originally from the village Byurakan and was a politician and agronomist, while her mother Burastan Murad Saponjyan was originally from town of Artchesh, (Western Armenia) and later an outstanding agronomist. Her parents had specialization of agronomist and specifically, her father studied at the Moscow Timiryazev Agricultural Academy from 1937 to 1941. She also moved to Moscow with her father; Parsamian studied at Moscow School N213 from 1938 to 1941. After the graduation in 1941, her father returned to Yerevan with his family, where E. Parsamian continued her studies in the School named after Mravyan, later, in 1946 she entered the School after Mayakovsky and in 1948 graduated the school with a gold medal. During her school years, she was admired by the study of astronomy

and decided to become an astronomer. Her uncle O. M. Saponjyan, who later became a corresponding member of NAS RA played a vital role in her decision of becoming an astronomer. For the first time, E. Parsamian met V. Ambartsumian when she was a schoolgirl in 1946, and he advised her to study Mathematics and English intensely to become an astronomer. Later Elma Parsamian entered the Yerevan State University and studied at the Astronomy Department of Physical and Mathematical Faculty from 1949 to 1954. After the graduation E. Parsamian has been employed at the Byurakan Astrophysical Observatory, where she has been working for more than six decades; she has published about 150 scientific and dozens of scientific-popular articles, mainly about astrophysics, as well as about the problems of ancient astronomy. During her first three working years, she investigated the Orion nebula with the help of nebular spectrograph for the purpose of determining the ratio of the amount of hydrogen and helium. The obtained results were quite inspirational and motivated her to enroll in postgraduate. (scientific supervisor, G. A. Gurzadyan) studies in 1957, where she continued deepening her astronomical knowledge, taking the Ph.D. qualifying examinations on the subjects of "Theory of Gaseous Nebulae", "Theory of Atomic Spectrum", "General Astrophysics". The colorimetric and polarimetric studies of the cometary nebulae were chosen as a topic for her scientific work. Naturally, on the first stage, her research career interests were more closely related to gaseous nebulae particularly to planetary and cometary nebulae and to detailed physical study of their nuclei. The observations were mainly carried out by 21" Schmidt telescope in the Byurakan Astrophysical Observatory and by 70cm Maksutov telescope in the Abastumani Astrophysical Observatory. The detailed colorimetric and polarimetric observation of such objects as NGC 2261, NGC 2245, NGC 2247, Anon 6^h04^m were carried out for the first time in the 20th century.

It was quite interesting her obtained relation between integral luminosity of cometary nebula and connected stellar brightness. “Colorimetric and polarimetric Investigations of the Cometary Nebula” was the topic for the Ph.D. (Doctorate of Philosophy) thesis, which she defended in the Yerevan State University in 1963. Later the scientist discovered more than four dozens of new cometary nebulae, composed their first catalog and performed their new classification. Nowadays, some of those nebulae are named in honor of Elma Parsamian. Elma Parsamian jointly with M. Kazarian discovered 8 new planetary nebulae besides the cometary ones, KzPn8 (Kazarian-Parsamian 8) of which is a unique object of great interest. The detailed spectral study of these objects has also been carried out.

The second stage of the astrophysical research is related, to the study of the variable, firstly, flare stars. E. Parsamian was actively involved in the flare stars observations and discovered more than 100 flare stars and more than 200 flares in the systems of Pleiades, Orion and NGC 7023. E. Parsamian achieved several significant results using the existing data, particularly the flare stars’ estimation method, which was developed by herself.

In general, one of the most important issues in Astrophysics is the age estimation of the cosmic objects. It should be mentioned that V. Ambartsumian has managed to reveal that both low-luminosity stars and low-mass red stars are, definitely, passing through the flare process during their young period. Although, for the clarification of the problem it was necessary to find the connection between flare activity and stellar age. Parsamian had a significant contribution in this field by developing a method that allows to estimate the age of star clusters, using the activity of flare stars in these systems. Moreover, a New formula was created to determine the age of separate flare stars in Solar vicinity. As an alternative method of determining the age of star clusters and stars, the study was highly valued by V. Ambartsumian.

In the same field, prediction made by famous Mexican astronomer Guillermo Haro about periodic nature of flares was of great importance as well, which later was proved in the joint works of Parsamian and Mexican astronomers.

There were significant results in the field of study of slow flares as well. Analysing the curves of flares, Parsamian classified them, got the relationship between the maximum flare stars luminosity and increase/decrease in brightness during the flare. This in its turn allowed better understand the depths where slow flares occur.

In 1983, studies on flare stars became the basis for E. Parsamian's thesis "Flare Stars in Stellar Aggregates". Observational material for the thesis was obtained by the author herself with 40-inch Schmidt telescope.

E. Parsamian's works on Exor (Subfuor) have their special place in the studies of stellar variations. These variables belong to rather mysterious objects extremely few in number, the physical nature of which is to be explained in the future.

Since 1980s, Elma Parsamian together with her Armenian, Mexican and Spanish colleagues, under her own supervision studied V1118 Ori and V1143 Ori subfuors in Orion constellation. As a result of the monitoring of these objects, 7 flares were recorded and their light curves of the whole process of flare were generated. It was shown that maximum amplitudes of changes in brightness do not have significant changes. Spectral studies of these objects were conducted as well. It is especially important to note the comparative study of ionized calcium infrared triplet behavior before and during the flare. It was observed that their spectra were similar to weak (WTTS) T Tau type stars during interflare periods and to classical (CTTS) T Tau type stars during the flares.

Despite the significant number of works in the field of astrophysics and her occupation, since 1966 E. Parsamian conducted important research on revealing the level of ancient astronomical

knowledge in the territory of Armenia. The studies of Metsamor observational platforms are among her known works. Metsamor is a unique object of its kind not only in Armenian but also world archaeoastronomy. Making necessary measurements and applying the methods of the Spherical Astronomy, E. Parsamian solved the issue: she distinguished the bright stars that ever appeared on the particular horizon point crossed by the imaginary continuation of the medium line of the platform, where the star's sign was depicted four times. It was the revelation of a mysterious small hill of Metsamor.

E. Parsamian calculations confirmed that around 2800-2600 BC the population of Metsamor observed Sirius. At those times, at the summer solstice Sirius could be viewed at dawn, in the rays of the Sun. It is not excluded that Metsamor people, like Egyptians, could take the first appearance of Sirius as the beginning of the new year. It proves that people of Armenian Highlands were well familiar with stellar sky and were able to use periodic appearance of the celestial body to count the time.

It should also be noted that since 1984 she was the first to propose the possibility of astronomical significance of Zorats Karer megalithic construction and compared the historical names of “Stonehenge” and “Karahunge” by dedicating several articles to this topic. Touching upon this issue by Parsamian should be regarded as a necessary attempt to draw our attention towards an interesting and complicated issue of the kind.

In addition to her productive scientific activity she was also engaged in pedagogical activities and was a lecturer at Yerevan State University and Armenian State Pedagogical University after Khachatur Abovyan. Later she was the head of the chair of “Theoretical Physics and Astronomy” at the Armenian State Pedagogical University after Khachatur Abovyan. During the 90’s, E. Parsamian worked and lectured at the National Institute of Astrophysics, Optics and Electronics in Mexico.

Parsamian's scientific activity was highly appreciated by scientific community and authorities and she was awarded certificates, medals, namely Anania Shirakatsi medal. E. Parsamian has taken part in 30 international scientific meetings and presented scientific reports almost in all of them.

During her scientific career she worked in various German, Mexican, Hungarian, Italian, Spanish and American scientific centres. Now she is a member of International Astronomical Union (IAU), European, Eurasian and Armenian astronomical societies. For many years she was a member of "Astrophysics" journal editorial board, Scientific Council of Byurakan Astrophysical Observatory and also the Specialized Council granting academic degrees affiliated to the Observatory, being a chair from 2005 to 2016.

E. Parsamian has a huge respect and love towards her teacher. It is not a coincidence that Elma Parsamian was the initiator and publisher of the third volume of V. Ambartsumian's scientific works and the book of memories dedicated to his 100th anniversary.

However, the scope of Parsamian's interests is not limited to astronomy. It encompasses other branches of science, arts, history and many more. She is a scholar in literature, especially in poetry. Being polyglot, she has read Russian, Spanish, English, German poets in the original. The testimony of her great love towards poetry is the small volume of her own verses.

E. Parsamian is also very passionate about other art fields, especially painting. It was her brother, famous painter Albert Parsamian who influenced her greatly.

Works and achievements of the scientist can be spoken of endlessly and whatever is written, we should always remember some features of her nature, such as constructive approach and devotion to the maintenance and development of Astrophysics in Armenia.

Haik Harutyunian

Biographical Data

Education

- ❖ 1938-1948 – Secondary school, Moscow - Yerevan
- ❖ 1949-1954 – Yerevan State University (YSU), student of Faculty of Physics and Mathematics
- ❖ 1957-1960 – Postgraduate student at Byurakan Astrophysical Observatory (BAO)
- ❖ 1963 – Candidate (PhD) of Physics and Mathematics, YSU, Armenia
- ❖ 1983 – Doctor of Physics and Mathematics, BAK, USSR, Moscow.
- ❖ 1989 – Professor, Education State Committee, Moscow

Fluent in Armenian, Russian, English, Spanish and has fair knowledge in German.

Positions / Pedagogical Activities

1954-1956, 1961-1966 – Junior Researcher (BAO)

1967-1985 – Senior Researcher (BAO)

1967-1971 – Simultaneously lectured “Stellar Photometry Measurement”, Faculty of Physics and Mathematics (Yerevan State University)

1983-1987 – Simultaneously, Associate Professor at Yerevan State Pedagogical University (YSPU), Head of the Chair of Astronomy and Theoretical Physics; lectured “General Astrophysics”, “History of Astronomy”

1985-2000 – Leading Researcher (BAO)

1989-1991 – Simultaneously, Professor at the Yerevan State University

1990-1991 – Lectured "History of Astronomy"

1991-1996 – Simultaneously, C level (highest level) Researcher,

1992 – lectured "Unstable Objects", "Variable Stars",

Instituto Nacional de Astrofísica, Óptica y Electrónica.

(INAOE), Mexico

Since 2000 – Principal Researcher

Main Scientific Directions

Gaseous Nebulae

Variable Stars

Archaeoastronomy

Supervised Theses

“The Spectral Stellar Study Associated with Cometary Nebulae”, V. Petrosian, 1984, BAO.

“Astronomical Observations in Medieval Armenia”, A. Barseghian, 1989, Moscow.

“The Application of Astrometric and Quantitative methods for the solution of several Ancient Armenian Calendar issues”, G. Brutian, 2005, BAO.

Membership

1976 – Member of the International Astronomical Union (IAU), Committees “Variable Stars”, “Stellar Associations and Star Clusters”

1976-2005 – Member of the Specialized Council at BAO for scientific degrees, 2005-2016 - the Chairman of the Council

- 1985-1988 – Vice-President of the “Flare Stars” working group of the Commission for “*Physics of Stars*”, The Academies of Sciences of Socialist Countries
- 1986-1991 – Member of the Council on Training of Personnel in Astronomy, USSR
- 1988-1992 – Member of the Editorial Board of the annual collection of “Historical-Astronomical Investigations”, Moscow, “NAUKA” Publishers
- 1990 – Member of the European Astronomical Society (EAS)
- 1990-1992 – Member of the Committee of the Soviet Scientists on Global Security
- 1990-1992 – Member of the Scientific-Methodological Committee for teaching Astronomy in the Universities and Institutes, USSR
- 1990 – Member of the Euro-Asian Astronomical Society (EAAS)
- 2000 – Member of Editorial Board of "Astrophysics", Yerevan, publ. National Academy of Sciences of Armenia
- 2000 – Corresponding member of the National Academy of Sciences of Armenia

Awards

Elma Parsamian has been awarded Governmental Awards including:

- 1979 – Medal "For Labor Valour", USSR
- 2003 – “Anania Shirakatsi” Medal, Republic of Armenia



1949



V. A. Sanamian, B. E. Margarian, E. H. Mirzabekian, H. S. Badalian, E. S. Parsamian, A. T. Kalloghlian, G. A. Gurzadian, 1956, Byurakan



V. V. Sobolev, E. S. Parsamian, Moscow, 1958



In front V. A. Ambartsumian, W. Saroyan, R. Shakhbazian, E. Parsamian, 1960



1960



E. S. Parsamian, B. Bok, L. V. Mirzoyan, 1965



IAU S029, Byurakan, 1966



At observations, 1967



With P. Sevak in Metsamor, 1969



1973



V. A. Ambartsumian, E. S. Parsamian, Cordoba, Argentina, 1974



Symposium, Byurakan, 1979



*E.S. Parsamian, G.N. Salukvadze, V.A. Ambartsumian, Tbilisi,
1982*



1988



Cornell University, USA, 1994



E.S.Parsamian, P. Pishmish, Mexico, 1994



Zorats Karer, 1984

Scientific Publications

1962

Colorimetry of the Cometary Nebula NGC 2261. E.S. Parsamian. Byurakan Obs. Contr., 30, 51-65, 1962.

1963

Polarimetry and Colorimetry of the Nebula NGC 2245. E.S. Parsamian. Byurakan Obs. Contr., 32, 3-15, 1963.

Polarimetry and Colorimetry of the Nebula NGC 2247. E.S. Parsamian. Byurakan Obs. Contr., 32, 17-24, 1963.

Colorimetric and Polarimetric Investigation of Some Cometary Nebulae. E.S. Parsamian. Doctoral Thesis (PhD), Yerevan, Moscow, 1-105, 1963.

Colorimetric and Polarimetric Investigation of Some Cometary Nebulae. E.S. Parsamian. Autoreferat of Doctoral Thesis, Yerevan, 1-10, 1963.

1964

New Measurement of Polarization of the NGC 2261. E.E. Khachikian, E.S. Parsamian. Byurakan Obs. Contr., 35, 71-73, 1964.

1965

List of Cometary Nebulae, Discovered on Palomar Charts. E.S. Parsamian. Izvest. Academy of Science of Armenia, XVIII, N2, 146-148, 1965.

Colorimetric Study of the Cometary Nebulae Anon 6h 04m. E.E. Khachikian, E.S. Parsamian. Astrofizika, 1, 417-428, 1965.

On Variability of Some Stars in the Orion Region. L.V. Mirzoyan, E.S. Parsamian. *Variable Stars*, 15, 470-473, 1965.

1966

Polarization of the Nebula IC 446. E.S. Parsamian. *Astrofizika*, 2, 369-371, 1966.

1967

Three New Flare Stars in the NGC 7023 Nebula Region. L.V. Mirzoyan, E.S. Parsamian, O.S. Chavushjan. *Astron. Circ.*, N399, 3-5, 1967.

Colorimetry of Nucleus of Galaxies NGC 3310 and NGC 3351. E.S. Parsamian. *Astrofizika* 3, 529-534, 1967.

Ancient Armenian Observatory. E.S. Parsamian, K.A. Mkrtchian. *Sky and Telescope*, November, 1967.

1968

Three New Flare Stars in NGC 7023 Region. L.V. Mirzoyan, E.S. Parsamian, O.S. Chavushian. *Byurakan Obs. Contr.*, 39, 3-9, 1968.

Colorimetric Investigation of the Nebula IC 446. E.S. Parsamian. *Byurakan Obs. Contr.*, 39, 10-18, 1968.

Flare Stars Near NGC 7023. L.V. Mirzoyan, E.S. Parsamian. *Non Periodic Phenomena in Var. Stars. IAU Colloq. N4*, Budapest, 165-167, 1968.

New Flare Stars in NGC 7023. L.V. Mirzoyan, E.S. Parsamian, N.K. Kalloglian. *Astron. Circ. URSS*, N 485, 7-8, 1968.

On Classification of Nucleus of Some Elliptical Galaxies. E.S. Parsamian. *Astrofizika*, 4, 150-152, 1968.

Old Rocky Constructions In Metsamor. E.S. Parsamian, K.A. Mkrtchian. «*Zemlja y Vselennaja*», *Acad.Sci.USSR*, 3, 11-12, 1968.

1969

- New Flare Stars in the Region Around NGC 7023. II. L.V. Mirzoyan, E.S. Parsamian, N.L. Kalloghlian. Byurakan Obs. Contr., 40, 31-34, 1969.
- New Flare Stars in the Pleiades. E. Parsamian, E. Chavira. Bol. Obs. Tonantzintla y Tacubaya, V.5 31, 35-40, 1969.
- H11 2411- A Hyades Flare Star. G. Haro, E. Parsamian. Bol. Obs. Tonantzintla y Tacubaya, V.5 31, 41-44, 1969.
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- On a New Variable Star in the Region of NGC 7023. E.S. Parsamian. Astron. Circ., Acad.of Sci. USSR, N 524, 8, 1969.
- Two Remarkable Flare Stars in Pleiades. E.S. Parsamian, O.S. Chavushian. Astrofizika 5, 499-502, 1969.
- On Possible Astronomical Significance of the Platforms of Metsamor (Armenia). E.S. Parsamian, K.A. Mkrtchian. Historic Astronomical Investigations, v. X, 35-40, 1969, Moscow, Nauka.

1970

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1971

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- New Flare Stars in the Region of NGC 7023. E.S. Parsamian, I. Jankovich. Byurakan Obs. Contr., 43, 3-5, 1971.
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- On Frequency of Flares of Star Haro 18 in the Pleiades. E.S. Parsamian. *Astrofizika* 7, 507-509, 1971.

1972

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- The Observation of the Spectra of Flare Star N 205 in the Pleiades. E.S. Parsamian. *Byurakan Obs. Contr.* 44, 14-16, 1972.
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1973

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1974

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1977

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Determination of the Age of Clusters by observations of Flare Stars. E.S. Parsamian. Star Cluster Symposium, ed. B.Balazs, Budapest, 119-127, 1977.

1978

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Flare Stars in the Orion Nebula Region. E.S. Parsamian, E. Chavira, G. Gonzalez. Bol. Inst. Tonantzintla 2, 341-343, 1978.

1979

Catalog of Cometary Nebulae and Related objects. E.S. Parsamian, V.M. Petrosian. Byurakan Obs. Contr., LI, 3-15, 1979.

1980

- Cometary Nebulae. E.S. Parsamian. Flare Stars, Fuors and Herbig-Haro Objects, International Symposium, Yerevan, 281-284, 1980.
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- The Frequency Distribution Function of Stellar Flares in the Orion Association. E.S. Parsamian. *Astrofizika* 16, 677-685, 1980.
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- On the Number of H α Emission Stars in the Orion Nebula Region. E.S. Parsamian. *Astrofizika* 17, 579-583, 1981.

1982

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- Flare Stars in Stellar Aggregates. Autoreferat of Thesis on Degree of Doctor of Physics and Mathematics. E.S. Parsamian. Yerevan, 1-20, 1982.
- Catalog of H α Emission Stars in the Region of the Orion Nebula. E.S. Parsamian, E. Chavira. *Bol. Inst. Tonantzintla* 3, 69-96, 1982.
- Small Metsamor Hill-Ancient Complex of Observational Platforms in Armenia. E.S. Parsamian.
- Cultural Progress in Bronze Age, International Symposium, Yerevan, 120-125, 1982.

1983

Eruptive Star in Taurus. E.S. Parsamian, G.B. Ohanian, E.S. Kazarian, I.Jankovich. Astr. Circ, N1269, 1983.

1984

The Colorimetry of Diffuse Nebulae S156, S157 A, S158, NGC 7536. E.S. Parsamian, V.M. Petrosian. Astrofizika 20, 495-502, 1984.

New Flare Stars in the Region of the Association Mon I., E.S. Parsamian, L.Rosino, O.S.Chavushian. Inf. Bull Var. Stars, N2620, 1-2, 1984.

The Mystery of Angelakot (Zoraz Kar).E.S.Parsamian.Kommunist, 1984, (rus.)

1985

On Astronomical Significance of Small Hill of Metsamor. E.S. Parsamian. Byurakan Obs. Contr 57, 92-100, 1985.

Character of Photometric Curves Based on Photographic Observations. E.S. Parsamian. Byurakan Obs. Contr., 57, 79-84, 1985.

On Possible Astronomical Significance of Megalitic Rings of Angelakot. E.S. Parsamian. Byurakan Obs. Contr. 57, 101-103, 1985.

Flare Stars and Stars with $H\alpha$ in the Emission in the Region of the Orion Nebula. E.S. Parsamian. Astrofizika, 22, 87-96, 1985.

New Flare Stars in the Mon I Association Region.E.S.Parsamian,L.Rosino,O.S.Chavushian. Astrofizika, 22, 315-324, 1985.

On the Problem of Duplicity of Flare Stars, E.S.Parsamian. Astrofizika, 22, 633-635, 1985.

New $H\alpha$ Emission Stars in the Dark Clouds of Tau Region. E.S.Parsamian, A.S.Hojaev. Astrofizika, 23, 203-208, 1985.

Flare Stars in Stellar Associations and Clusters and Their Place in Star Evolution. E.S.Parsamian. III-rd Latin American

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