

## Xue She-Sheng

Position: ICRANet Faculty

Period covered: 2016 -- 2017



### I Scientific Work

Strong and pulsating electromagnetic field in gravitational collapse and heavy atoms, as well as its relevance to Gamma-Ray Bursts (GRBs) and heavy atom physics.

Strong electromagnetic field in compact stars and heavy atoms and its relevance to their structure and properties.

Pair production rates and radiation in strong and time-varying electromagnetic fields, and its applications in physics and astrophysics.

Pair production and interactions of fields and matter in the cosmological evolution within the framework of Einstein-Maxwell theory.

Four-fermion interactions of Einstein-Cartan theory and its resulted particle spectra for matter and dark matter.

The opacity of high energy cosmic particles in terms of their energy and travelling distance.

See the following list of publications.

### II Conferences and educational activities

#### *II a Conferences and Other External Scientific Work*

Participating the organizations of ICRANet meetings in Korea and China: the 15th Italian-Korean meeting (July, 2017, Seoul, Korea) and 5th Galileo –Xu Guangqi meeting (GX5, June, 2017).

Participating the organization of MG15 Rome, July 2018.

Participating the preparation of ICRANet agreements with Institutions of China (2017).

Participating the preparation of ICRANet outreach activities: ICRANet exhibitions in Pescara and Rome, la Notte Europea dei Ricercatori 2017 and Besso foundation.

#### *II b Work With Students*

Wang Yu and Rahim Moradi (IRAP Ph.D. students), Li Liang and Luis Gabriel Gómez Díaz, (Erasmus Mundus Ph.D. students), David Melon Fuksman, Yu Ling Chang and Yen-Chen Chen, Iranian Ph.D.

students, Soroush Shakeri, Maryam Amiri, B. Eslam Panah and Rashid Riahi, as well as Takahiro Hayashinaka, Cheng-Jun Xia (supported by their nation).

#### *II c Diploma thesis supervision (2012-2017)*

Yuanbin Wu, Handrik Ludwig, Eckhard Strobel, and Clement Stahl (all are Erasmus Mundus Ph.D. students), their main publications: 10 in Phys. Rev. , and 5 in Nucl. Phys., Phys. Lett.

#### *II d Other Teaching Duties (2012-2017)*

Teaching courses in Nice and Les Houches schools for IRAP Ph.D. Erasmus Mundus students.

#### *II e. Work With Professors and Postdocs inside and outside ICRANet (2012-2017)*

R. Ruffini, H. Kleinert, G. Vereshchagin, J. Rueda, C. Bianco, W.B. Han, I. Siutsou, C. Argulles, C. Gruber, R. Mohammadi, D. Bégué, E. Bavarsad and Sang Pyo Kim.

**III. Service activities** [*activities carried out in collaboration with ICRANet (e.g. teaching activities, conferences etc...) and outside ICRANet (teaching activities in your university etc...)*]

#### *III a. Within ICRANet*

Participating organization of ICRANet Seminars and ICRANet outreach activity.  
Participating preparation of ICRANet Newsletter. Working with ICRANet administration.

#### *III b. Outside ICRANet*

*Visiting Chinese Institutions IHEP and ITP that are in cooperation with ICRANet .*

### **IV. Other**

#### **List of Publications (2016 - 2017)**

- R. Ruffini, G. Vereshchagin and S.-S. Xue, "Cosmic absorption of ultra high energy particles", *Astrophysics and Space Science*, Volume 361:82, 2016.
- S. Batebi, R. Mohammadi, R. Ruffini, S. Tizchang, and S.-S. Xue, "Generation of circular polarization of gamma ray bursts", *Phys. Rev. D* 94, 065033 (2016).
- C. Stahl, E. Strobel, and S.-S. Xue, "Fermionic current and Schwinger effect in de Sitter spacetime", *Phys. Rev. D* 93, 025004 (2016).
- R. Mohammadi, J. Khodagholizadeh, M. Sadegh, and S.-S. Xue, "B-mode polarization of the CMB and the cosmic neutrino background", *Phys. Rev. D* 93, 125029 (2016).
- S.-S. Xue, "Fermion masses from top quark to electron neutrino", *Phys. Rev. D* 93, 073001 (2016) and *JHEP* 11, 027 (2016).
- C. Stahl and S.-S. Xue, "Schwinger effect and backreaction in de Sitter spacetime", *Phys. Lett B* 760, 288-292 (2016).

- E. Bavarsad, C. Stahl, S.-S. Xue, "Scalar current of created pairs by Schwinger mechanism in de Sitter spacetime", *Phys. Rev. D* 94, 104011 (2016).
- S.-S. Xue, "An effective strong-coupling theory in UV-domain" *JHEP* 05, 146 (2017).
- S. Shakeri, S. Z. Kalantari, and S.-S. Xue, "Polarization of a probe laser beam due to nonlinear QED effects", *Physical Review A* 95, 012108 (2017).
- S. Shakeri, M. Haghghat, S.-S. Xue, "Nonlinear QED effects in X-ray emission of pulsars", *JCAP* 10, 014 (2017).
- R. Moradi, C. Stahl, J. Firouzjaee, S.-S. Xue, "Charged cosmological black hole", *Phys. Rev. D* 96, 104007, 2017.
- C. Cherubini, S. Filippi, A. Loppini, R. Ruffini, R. Moradi, Y. Wang, and S.-S. Xue, "On Perfect Relativistic magnetohydrodynamics around black holes in horizon penetrating coordinates" to appear in *Phys. Rev. D* (2018)
- E. Bavarsad, S. P. Kim, C. Stahl, S.-S. Xue, "Effect of a magnetic field on Schwinger mechanism in de Sitter spacetime", to appear in *Phys. Rev. D* (2018).
- R. Ruffini, et al., "Early X-Ray Flares in GRBs", to appear in *ApJ* (2018) .
- C. Stahl, S. Eckhard and S.-S. Xue, "Pair creation in the early universe", the proceedings of Fourteenth Marcel Grossmann Meeting - MG14, World scientific. 2017.
- T. Seddigheh, B. Saghar; M. Rohollah, R. Ruffini, G. Vereshchagin, S.-S. Xue, "On the interaction of high energy photons with the cosmic microwave background", the proceedings of Fourteenth Marcel Grossmann Meeting - MG14, World scientific, 2017.
- B. Saghar, T. Seddigheh, M. Rohollah, R. Ruffini, S.-S. Xue, "On the interaction of high energy photons with the cosmic microwave background", the proceedings of Fourteenth Marcel Grossmann Meeting - MG14, World scientific, 2017