

## A review of the progress of LHAASO charged cosmic ray measurement

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**Zhang Shoushan<sup>a,b,c,\*</sup> for the LHAASO collaboration**

<sup>a</sup>*The Institute of High Energy Physics of the Chinese Academy of Sciences,  
YuQuan Road.19B, shijingshan district, Beijing, China*

<sup>b</sup>*University of Chinese Academy of Sciences, Department,  
YuQuan Road.19A, shijingshan district, Beijing, China*

<sup>c</sup>*TIANFU Cosmic Ray Research Center,  
Chengdu, Sichuan, China*

*E-mail: [zhangss@ihep.ac.cn](mailto:zhangss@ihep.ac.cn)*

Large High-Altitude Air Shower Observatory (LHAASO) is a hybrid detector experiment, including one square kilometer array of scintillator detectors and muon detectors, a 78,000 square meter water Cherenkov detector array and 18 wide field of view Cherenkov telescopes. Multi-parameter observation of showers allows LHAASO to measurement the single elements energy spectrum, elemental composition and anisotropy with high resolution, which give us an excellent opportunity to understand the origin, acceleration and propagation of high energy cosmic rays. The one quarter, the half, the three quarter and the full array of LHAASO have started running in September 2019, in January 2020, in December 2020 and in July 2021, respectively. We use the moon shadow displacement measured by LHAASO to establish an absolute energy calibration method for the ground-based detector array. Accurate measurement of the single element energy spectrum near the knee region and different component group of anisotropy will be achieved by LHAASO, which are essential to reveal the acceleration and propagation mechanism of high energy cosmic rays. This paper will introduce the progress of proton, proton and helium, and all particle energy spectra near the 'knee' region measured by LHAASO, as well as cosmic ray anisotropy and cosmic ray composition.

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\*Speaker

## Full Authors List: LHAASO Collaboration

Zhen Cao<sup>1,2,3</sup>, F. Aharonian<sup>4,5</sup>, Q. An<sup>6,7</sup>, Axikegu<sup>8</sup>, L.X. Bai<sup>9</sup>, Y.X. Bai<sup>1,3</sup>, L.X. Bai<sup>9</sup>, Y.X. Bai<sup>1,3</sup>, Y.W. Bao<sup>10</sup>, D. Bastieri<sup>11</sup>, X.J. Bi<sup>1,2,3</sup>, Y.J. Bi<sup>1,3</sup>, H. Cai<sup>12</sup>, J.T. Cai<sup>11</sup>, Zhe Cao<sup>6,7</sup>, J. Chang<sup>13</sup>, J.F. Chang<sup>1,3,6</sup>, B.M. Chen<sup>14</sup>, E.S. Chen<sup>1,2,3</sup>, J. Chen<sup>9</sup>, Liang Chen<sup>1,2,3</sup>, Liang Chen<sup>15</sup>, Long Chen<sup>8</sup>, M.J. Chen<sup>1,3</sup>, M.L. Chen<sup>1,3,6</sup>, Q.H. Chen<sup>8</sup>, S.H. Chen<sup>1,2,3</sup>, S.Z. Chen<sup>1,3</sup>, T.L. Chen<sup>16</sup>, X.L. Chen<sup>1,2,3</sup>, Y. Chen<sup>10</sup>, N. Cheng<sup>1,3</sup>, Y.D. Cheng<sup>1,3</sup>, S.W. Cui<sup>14</sup>, X.H. Cui<sup>17</sup>, Y.D. Cui<sup>18</sup>, B. D'Ettorre Piazzoli<sup>19</sup>, B.Z. Dai<sup>20</sup>, H.L. Dai<sup>1,3,6</sup>, Z.G. Dai<sup>7</sup>, Danzengluobu<sup>16</sup>, D. della Volpe<sup>21</sup>, X.J. Dong<sup>1,3</sup>, K.K. Duan<sup>13</sup>, J.H. Fan<sup>11</sup>, Y.Z. Fan<sup>13</sup>, Z.X. Fan<sup>1,3</sup>, J. Fang<sup>20</sup>, K. Fang<sup>1,3</sup>, C.F. Feng<sup>22</sup>, L. Feng<sup>13</sup>, S.H. Feng<sup>1,3</sup>, Y.L. Feng<sup>13</sup>, B. Gao<sup>1,3</sup>, C.D. Gao<sup>22</sup>, L.Q. Gao<sup>1,2,3</sup>, Q. Gao<sup>16</sup>, W. Gao<sup>22</sup>, M.M. Ge<sup>20</sup>, L.S. Geng<sup>1,3</sup>, G.H. Gong<sup>23</sup>, Q.B. Gou<sup>1,3</sup>, M.H. Gu<sup>1,3,6</sup>, F.L. Guo<sup>15</sup>, J.G. Guo<sup>1,2,3</sup>, X.L. Guo<sup>8</sup>, Y.Q. Guo<sup>1,3</sup>, Y.Y. Guo<sup>1,2,3,13</sup>, Y.A. Han<sup>24</sup>, H.H. He<sup>1,2,3</sup>, H.N. He<sup>13</sup>, J.C. He<sup>1,2,3</sup>, S.L. He<sup>11</sup>, X.B. He<sup>18</sup>, Y. He<sup>8</sup>, M. Heller<sup>21</sup>, Y.K. Hor<sup>18</sup>, C. Hou<sup>1,3</sup>, H.B. Hu<sup>1,2,3</sup>, S. Hu<sup>9</sup>, S.C. Hu<sup>1,2,3</sup>, X.J. Hu<sup>23</sup>, D.H. Huang<sup>8</sup>, Q.L. Huang<sup>1,3</sup>, W.H. Huang<sup>22</sup>, X.T. Huang<sup>22</sup>, X.Y. Huang<sup>13</sup>, Z.C. Huang<sup>8</sup>, F. Ji<sup>1,3</sup>, X.L. Ji<sup>1,3,6</sup>, H.Y. Jia<sup>8</sup>, K. Jiang<sup>6,7</sup>, Z.J. Jiang<sup>20</sup>, C. Jin<sup>1,2,3</sup>, T. Ke<sup>1,3</sup>, D. Kuleshov<sup>25</sup>, K. Levochkin<sup>25</sup>, B.B. Li<sup>14</sup>, Cheng Li<sup>6,7</sup>, Cong Li<sup>1,3</sup>, F. Li<sup>1,3,6</sup>, H.B. Li<sup>1,3</sup>, H.C. Li<sup>1,3</sup>, H.Y. Li<sup>7,13</sup>, J. Li<sup>1,3,6</sup>, K. Li<sup>1,3,6</sup>, W.L. Li<sup>22</sup>, X.R. Li<sup>1,3</sup>, Xin Li<sup>6,7</sup>, Xin Li<sup>8</sup>, Y. Li<sup>9</sup>, Y.Z. Li<sup>1,2,3</sup>, Zhe Li<sup>1,3</sup>, Zhuo Li<sup>26</sup>, E.W. Liang<sup>27</sup>, Y.F. Liang<sup>27</sup>, S.J. Lin<sup>18</sup>, B. Liu<sup>7</sup>, C. Liu<sup>1,3</sup>, D. Liu<sup>22</sup>, H. Liu<sup>8</sup>, H.D. Liu<sup>24</sup>, J. Liu<sup>1,3</sup>, J.L. Liu<sup>28</sup>, J.S. Liu<sup>18</sup>, J.Y. Liu<sup>1,3</sup>, M.Y. Liu<sup>16</sup>, R.Y. Liu<sup>10</sup>, S.M. Liu<sup>8</sup>, W. Liu<sup>1,3</sup>, Y. Liu<sup>11</sup>, Y.N. Liu<sup>23</sup>, Z.X. Liu<sup>9</sup>, W.J. Long<sup>8</sup>, R. Lu<sup>20</sup>, H.K. Lv<sup>1,3</sup>, B.Q. Ma<sup>26</sup>, L.L. Ma<sup>1,3</sup>, X.H. Ma<sup>1,3</sup>, J.R. Mao<sup>29</sup>, A. Masood<sup>8</sup>, Z. Min<sup>1,3</sup>, W. Mitthumsiri<sup>30</sup>, T. Montaruli<sup>21</sup>, Y.C. Nan<sup>22</sup>, B.Y. Pang<sup>8</sup>, P. Pattarakijwanich<sup>30</sup>, Z.Y. Pei<sup>11</sup>, M.Y. Qi<sup>1,3</sup>, Y.Q. Qi<sup>14</sup>, B.Q. Qiao<sup>1,3</sup>, J.J. Qin<sup>7</sup>, D. Ruffolo<sup>30</sup>, V. Rulev<sup>25</sup>, A. Sáiz<sup>30</sup>, L. Shao<sup>14</sup>, O. Shchegolev<sup>25,31</sup>, X.D. Sheng<sup>1,3</sup>, J.Y. Shi<sup>1,3</sup>, H.C. Song<sup>26</sup>, Yu.V. Stenkin<sup>25,31</sup>, V. Stepanov<sup>25</sup>, Y. Su<sup>32</sup>, Q.N. Sun<sup>8</sup>, X.N. Sun<sup>27</sup>, Z.B. Sun<sup>33</sup>, P.H.T. Tam<sup>18</sup>, Z.B. Tang<sup>6,7</sup>, W.W. Tian<sup>2,17</sup>, B.D. Wang<sup>1,3</sup>, C. Wang<sup>33</sup>, H. Wang<sup>8</sup>, H.G. Wang<sup>11</sup>, J.C. Wang<sup>29</sup>, J.S. Wang<sup>28</sup>, L.P. Wang<sup>22</sup>, L.Y. Wang<sup>1,3</sup>, R.N. Wang<sup>8</sup>, W. Wang<sup>18</sup>, W. Wang<sup>12</sup>, X.G. Wang<sup>27</sup>, X.J. Wang<sup>1,3</sup>, X.Y. Wang<sup>10</sup>, Y. Wang<sup>8</sup>, Y.D. Wang<sup>1,3</sup>, Y.J. Wang<sup>1,3</sup>, Y.P. Wang<sup>1,2,3</sup>, Z.H. Wang<sup>9</sup>, Z.X. Wang<sup>20</sup>, Zhen Wang<sup>28</sup>, Zheng Wang<sup>1,3,6</sup>, D.M. Wei<sup>13</sup>, J.J. Wei<sup>13</sup>, Y.J. Wei<sup>1,2,3</sup>, T. Wen<sup>20</sup>, C.Y. Wu<sup>1,3</sup>, H.R. Wu<sup>1,3</sup>, S. Wu<sup>1,3</sup>, W.X. Wu<sup>8</sup>, X.F. Wu<sup>13</sup>, S.Q. Xi<sup>1,3</sup>, J. Xia<sup>7,13</sup>, J.J. Xia<sup>8</sup>, G.M. Xiang<sup>2,15</sup>, D.X. Xiao<sup>16</sup>, G. Xiao<sup>1,3</sup>, H.B. Xiao<sup>11</sup>, G.G. Xin<sup>12</sup>, Y.L. Xin<sup>8</sup>, Y. Xing<sup>15</sup>, D.L. Xu<sup>28</sup>, R.X. Xu<sup>26</sup>, L. Xue<sup>22</sup>, D.H. Yan<sup>29</sup>, J.Z. Yan<sup>13</sup>, C.W. Yang<sup>9</sup>, F.F. Yang<sup>1,3,6</sup>, J.Y. Yang<sup>18</sup>, L.L. Yang<sup>18</sup>, M.J. Yang<sup>1,3</sup>, R.Z. Yang<sup>7</sup>, S.B. Yang<sup>20</sup>, Y.H. Yao<sup>9</sup>, Z.G. Yao<sup>1,3</sup>, Y.M. Ye<sup>23</sup>, L.Q. Yin<sup>1,3</sup>, N. Yin<sup>22</sup>, X.H. You<sup>1,3</sup>, Z.Y. You<sup>1,2,3</sup>, Y.H. Yu<sup>22</sup>, Q. Yuan<sup>13</sup>, H.D. Zeng<sup>13</sup>, T.X. Zeng<sup>1,3,6</sup>, W. Zeng<sup>20</sup>, Z.K. Zeng<sup>1,2,3</sup>, M. Zha<sup>1,3</sup>, X.X. Zhai<sup>1,3</sup>, B.B. Zhang<sup>10</sup>, H.M. Zhang<sup>10</sup>, H.Y. Zhang<sup>22</sup>, J.L. Zhang<sup>17</sup>, J.W. Zhang<sup>9</sup>, L.X. Zhang<sup>11</sup>, Li Zhang<sup>20</sup>, Lu Zhang<sup>14</sup>, P.F. Zhang<sup>20</sup>, P.P. Zhang<sup>14</sup>, R. Zhang<sup>7,13</sup>, S.R. Zhang<sup>14</sup>, S.S. Zhang<sup>1,3</sup>, X. Zhang<sup>10</sup>, X.P. Zhang<sup>1,3</sup>, Y.F. Zhang<sup>8</sup>, Y.L. Zhang<sup>1,3</sup>, Yi Zhang<sup>1,13</sup>, Yong Zhang<sup>1,3</sup>, B. Zhao<sup>8</sup>, J. Zhao<sup>1,3</sup>, L. Zhao<sup>6,7</sup>, L.Z. Zhao<sup>14</sup>, S.P. Zhao<sup>13,22</sup>, F. Zheng<sup>33</sup>, Y. Zheng<sup>8</sup>, B. Zhou<sup>1,3</sup>, H. Zhou<sup>28</sup>, J.N. Zhou<sup>15</sup>, P. Zhou<sup>10</sup>, R. Zhou<sup>9</sup>, X.X. Zhou<sup>8</sup>, C.G. Zhu<sup>22</sup>, F.R. Zhu<sup>8</sup>, H. Zhu<sup>17</sup>, K.J. Zhu<sup>1,2,3,6</sup> and X. Zuo<sup>1,3</sup>

<sup>1</sup>Key Laboratory of Particle Astrophysics & Experimental Physics Division & Computing Center, Institute of High Energy Physics, Chinese Academy of Sciences, 100049 Beijing, China.

<sup>2</sup>University of Chinese Academy of Sciences, 100049 Beijing, China.

<sup>3</sup>TIANFU Cosmic Ray Research Center, Chengdu, Sichuan, China.

<sup>4</sup>Dublin Institute for Advanced Studies, 31 Fitzwilliam Place, 2 Dublin, Ireland.

<sup>5</sup>Max-Planck-Institut für Nuclear Physics, P.O. Box 103980, 69029 Heidelberg, Germany.

<sup>6</sup>State Key Laboratory of Particle Detection and Electronics, China.

<sup>7</sup>University of Science and Technology of China, 230026 Hefei, Anhui, China.

<sup>8</sup>School of Physical Science and Technology & School of Information Science and Technology, Southwest Jiaotong University, 610031 Chengdu, Sichuan, China.

<sup>9</sup>College of Physics, Sichuan University, 610065 Chengdu, Sichuan, China.

<sup>10</sup>School of Astronomy and Space Science, Nanjing University, 210023 Nanjing, Jiangsu, China.

<sup>11</sup>Center for Astrophysics, Guangzhou University, 510006 Guangzhou, Guangdong, China.

<sup>12</sup>School of Physics and Technology, Wuhan University, 430072 Wuhan, Hubei, China.

<sup>13</sup>Key Laboratory of Dark Matter and Space Astronomy, Purple Mountain Observatory, Chinese Academy of Sciences, 210023 Nanjing, Jiangsu, China.

<sup>14</sup>Hebei Normal University, 050024 Shijiazhuang, Hebei, China.

<sup>15</sup>Key Laboratory for Research in Galaxies and Cosmology, Shanghai Astronomical Observatory, Chinese Academy of Sciences, 200030 Shanghai, China.

<sup>16</sup>Key Laboratory of Cosmic Rays (Tibet University), Ministry of Education, 850000 Lhasa, Tibet, China.

<sup>17</sup>National Astronomical Observatories, Chinese Academy of Sciences, 100101 Beijing, China.

<sup>18</sup>School of Physics and Astronomy & School of Physics (Guangzhou), Sun Yat-sen University, 519000 Zhuhai, Guangdong, China.

<sup>19</sup>Dipartimento di Fisica dell'Università di Napoli "Federico II", Complesso Universitario di Monte Sant'Angelo, via Cinthia, 80126 Napoli, Italy.

<sup>20</sup>School of Physics and Astronomy, Yunnan University, 650091 Kunming, Yunnan, China.

<sup>21</sup>Departement de Physique Nucleaire et Corpusculaire, Faculte de Sciences, Universite de Gen'ève, 24 Quai Ernest Ansermet, 1211 Geneva, Switzerland.

<sup>22</sup>Institute of Frontier and Interdisciplinary Science, Shandong University, 266237 Qingdao, Shandong, China.

<sup>23</sup>Department of Engineering Physics, Tsinghua University, 100084 Beijing, China.

<sup>24</sup>School of Physics and Microelectronics, Zhengzhou University, 450001 Zhengzhou, Henan, China.

<sup>25</sup>Institute for Nuclear Research of Russian Academy of Sciences, 117312 Moscow, Russia.

<sup>26</sup>School of Physics, Peking University, 100871 Beijing, China.

<sup>27</sup>School of Physical Science and Technology, Guangxi University, 530004 Nanning, Guangxi, China.

<sup>28</sup>Tsung-Dao Lee Institute & School of Physics and Astronomy, Shanghai Jiao Tong University, 200240 Shanghai, China.

<sup>29</sup>Yunnan Observatories, Chinese Academy of Sciences, 650216 Kunming, Yunnan, China.

<sup>30</sup>Department of Physics, Faculty of Science, Mahidol University, 10400 Bangkok, Thailand.

<sup>31</sup>Moscow Institute of Physics and Technology, 141700 Moscow, Russia.

<sup>32</sup>Key Laboratory of Radio Astronomy, Purple Mountain Observatory, Chinese Academy of Sciences, 210023 Nanjing, Jiangsu, China.

<sup>33</sup>National Space Science Center, Chinese Academy of Sciences, 100190 Beijing, China.