

The SHiP Collaboration

C. Ahdida⁴⁴, A. Akmete⁴⁸, R. Albanese^{14,d,h}, A. Alexandrov^{14,32,34,d},
A. Anokhina³⁹, S. Aoki¹⁸, G. Arduini⁴⁴, E. Atkin³⁸, N. Azorskiy²⁹,
J.J. Back⁵⁴, A. Bagulya³², F. Baaltasar Dos Santos⁴⁴, A. Baranov⁴⁰,
F. Bardou⁴⁴, G.J. Barker⁵⁴, M. Battistin⁴⁴, J. Bauche⁴⁴, A. Bay⁴⁶,
V. Bayliss⁵¹, G. Bencivenni¹⁵, A.Y. Berdnikov³⁷, Y.A. Berdnikov³⁷,
M. Bertani¹⁵, C. Betancourt⁴⁷, I. Bezshyiko⁴⁷, O. Bezshyyko⁵⁵, D. Bick⁸,
S. Bieschke⁸, A. Blanco²⁸, J. Boehm⁵¹, M. Bogomilov¹, I. Boiarska³,
K. Bondarenko^{27,57}, W.M. Bonivento¹³, J. Borburgh⁴⁴, A. Boyarsky^{27,55},
R. Brenner⁴³, D. Breton⁴, V. Büscher¹⁰, A. Buonaura⁴⁷, S. Buontempo¹⁴,
S. Cadeddu¹³, A. Calcaterra¹⁵, M. Calviani⁴⁴, M. Campanelli⁵³,
M. Casolino⁴⁴, N. Charitonidis⁴⁴, P. Chau¹⁰, J. Chauveau⁵, A. Chepurinov³⁹,
M. Chernyavskiy³², K.-Y. Choi²⁶, A. Chumakov², P. Ciambrone¹⁵,
V. Cicero¹², L. Congedo^{11,a}, K. Cornelis⁴⁴, M. Cristinziani⁷, A. Crupano^{14,d},
G.M. Dallavalle¹², A. Datwyler⁴⁷, N. D'Ambrosio¹⁶, G. D'Appollonio^{13,c},
R. de Asmundis¹⁴, J. De Carvalho Saraiva²⁸, G. De Lellis^{14,34,44,d},
M. de Magistris^{14,l}, A. De Roeck⁴⁴, M. De Serio^{11,a}, D. De Simone⁴⁷,
L. Dedenko³⁹, P. Dergachev³⁴, A. Di Crescenzo^{14,d}, L. Di Giulio⁴⁴,
N. Di Marco¹⁶, C. Dib², H. Dijkstra⁴⁴, V. Dmitrenko³⁸, L.A. Dougherty⁴⁴,
A. Dolmatov³³, D. Domenici¹⁵, S. Donskov³⁵, V. Drohan⁵⁵, A. Dubreuil⁴⁵,
O. Durhan⁴⁸, M. Ehlert⁶, E. Elikkaya⁴⁸, T. Enik²⁹, A. Etenko^{33,38},
F. Fabbri¹², O. Fedin³⁶, F. Fedotovs⁵², G. Felici¹⁵, M. Ferrillo⁴⁷,
M. Ferro-Luzzi⁴⁴, K. Filippov³⁸, R.A. Fini¹¹, P. Fonte²⁸, C. Franco²⁸,
M. Fraser⁴⁴, R. Fresa^{14,i,h}, R. Froeschl⁴⁴, T. Fukuda¹⁹, G. Galati^{14,d},
J. Gall⁴⁴, L. Gatignon⁴⁴, G. Gavrillov³⁶, V. Gentile^{14,d}, B. Goddard⁴⁴,
L. Golinka-Bezshyyko⁵⁵, A. Golovatiuk^{14,d}, V. Golovtsov³⁶, D. Golubkov³⁰,
A. Golutvin^{52,34}, P. Gorbounov⁴⁴, D. Gorbunov³¹, S. Gorbunov³²,
V. Gorkavenko⁵⁵, M. Gorshenkov³⁴, V. Grachev³⁸, A.L. Grandchamp⁴⁶,
E. Graverini⁴⁶, J.-L. Grenard⁴⁴, D. Grenier⁴⁴, V. Grichine³², N. Gruzinskii³⁶,
A. M. Guler⁴⁸, Yu. Guz³⁵, G.J. Haefeli⁴⁶, C. Hagner⁸, H. Hakobyan²,
I.W. Harris⁴⁶, E. van Herwijnen³⁴, C. Hessler⁴⁴, A. Hollnagel¹⁰, B. Hosseini⁵²,
M. Hushchyn⁴⁰, G. Iaselli^{11,a}, A. Iuliano^{14,d}, R. Jacobsson⁴⁴, D. Joković⁴¹,
M. Jonker⁴⁴, I. Kadenko⁵⁵, V. Kain⁴⁴, B. Kaiser⁸, C. Kamiscioglu⁴⁹,
D. Karpenkov³⁴, K. Kershaw⁴⁴, M. Khabibullin³¹, E. Khalikov³⁹,
G. Khaustov³⁵, G. Khoraiuli¹⁰, A. Khotyantsev³¹, Y.G. Kim²³, V. Kim^{36,37},
N. Kitagawa¹⁹, J.-W. Ko²², K. Kodama¹⁷, A. Kolesnikov²⁹, D.I. Kolev¹,
V. Kolosov³⁵, M. Komatsu¹⁹, A. Kono²¹, N. Konovalova^{32,34},
S. Kormannshaus¹⁰, I. Korol⁶, I. Korol'ko³⁰, A. Korzenev⁴⁵, V. Kostyukhin⁷,
E. Koukovini Platia⁴⁴, S. Kovalenko², I. Krasilnikova³⁴, Y. Kudenko^{31,38,g},
E. Kurbatov⁴⁰, P. Kurbatov³⁴, V. Kurochka³¹, E. Kuznetsova³⁶,
H.M. Lacker⁶, M. Lamont⁴⁴, G. Lanfranchi¹⁵, O. Lantwin^{47,34}, A. Lauria^{14,d},
K.S. Lee²⁵, K.Y. Lee²², J.-M. Lévy⁵, V.P. Loschiavo^{14,h}, L. Lopes²⁸,
E. Lopez Sola⁴⁴, V. Lyubovitskij², J. Maalmi⁴, A. Magnan⁵², V. Maleev³⁶,
A. Malinin³³, Y. Manabe¹⁹, A.K. Managadze³⁹, M. Manfredi⁴⁴, S. Marsh⁴⁴,
A.M. Marshall⁵⁰, A. Mefodev³¹, P. Mermod⁴⁵, A. Miano^{14,d}, S. Mikado²⁰,

Yu. Mikhaylov³⁵, D.A. Milstead⁴², O. Mineev³¹, A. Montanari¹²,
 M.C. Montesi^{14,d}, K. Morishima¹⁹, S. Movchan²⁹, Y. Muttoni⁴⁴,
 N. Naganawa¹⁹, M. Nakamura¹⁹, T. Nakano¹⁹, S. Nasybulin³⁶, P. Ninin⁴⁴,
 A. Nishio¹⁹, A. Novikov³⁸, B. Obinyakov³³, S. Ogawa²¹, N. Okateva^{32,34},
 B. Opitz⁸, J. Osborne⁴⁴, M. Ovchynnikov^{27,55}, N. Owtscharenko⁷,
 P.H. Owen⁴⁷, P. Pacholek⁴⁴, A. Paoloni¹⁵, B.D. Park²², A. Pastore¹¹,
 M. Patel^{52,34}, D. Pereyma³⁰, A. Perillo-Marccone⁴⁴, G.L. Petkov¹,
 K. Petridis⁵⁰, A. Petrov³³, D. Podgrudkov³⁹, V. Poliakov³⁵,
 N. Polukhina^{32,34,38}, J. Prieto Prieto⁴⁴, M. Prokudin³⁰, A. Prota^{14,d},
 A. Quercia^{14,d}, A. Rademakers⁴⁴, A. Rakai⁴⁴, F. Ratnikov⁴⁰, T. Rawlings⁵¹,
 F. Redi⁴⁶, S. Ricciardi⁵¹, M. Rinaldesi⁴⁴, Volodymyr Rodin⁵⁵, Viktor Rodin⁵⁵,
 P. Robbe⁴, A.B. Rodrigues Cavalcante⁴⁶, T. Roganova³⁹, H. Rokujo¹⁹,
 G. Rosa^{14,d}, T. Rovelli^{12,b}, O. Ruchayskiy³, T. Ruf⁴⁴, V. Samoylenko³⁵,
 V. Samsonov³⁸, F. Sanchez Galan⁴⁴, P. Santos Diaz⁴⁴, A. Sanz Ull⁴⁴,
 A. Saputi¹⁵, O. Sato¹⁹, E.S. Savchenko³⁴, J.S. Schliwinski⁶,
 W. Schmidt-Parzefall⁸, N. Serra^{47,34}, S. Sgobba⁴⁴, O. Shadura⁵⁵, A. Shakin³⁴,
 M. Shaposhnikov⁴⁶, P. Shatalov^{30,34}, T. Shchedrina^{32,34}, L. Shchutska⁴⁶,
 V. Shevchenko^{33,34}, H. Shibuya²¹, S. Shirobokov⁵², A. Shustov³⁸,
 S.B. Silverstein⁴², S. Simone^{11,a}, R. Simoniello¹⁰, M. Skorokhvatov^{38,33},
 S. Smirnov³⁸, J.Y. Sohn²², A. Sokolenko⁵⁵, E. Solodko⁴⁴, N. Starkov^{32,34},
 L. Stoel⁴⁴, M.E. Stramaglia⁴⁶, D. Sukhonos⁴⁴, Y. Suzuki¹⁹, S. Takahashi¹⁸,
 J.L. Tastet³, P. Teterin³⁸, S. Than Naing³², I. Timiryasov⁴⁶, V. Tioukov¹⁴,
 D. Tommasini⁴⁴, M. Torii¹⁹, N. Tosi¹², D. Treille⁴⁴, R. Tsenov^{1,29}, S. Ulin³⁸,
 E. Ursov³⁹, A. Ustyuzhanin^{40,34}, Z. Uteshev³⁸, L. Uvarov³⁶,
 G. Vankova-Kirilova¹, F. Vannucci⁵, V. Venturi⁴⁴, S. Vilchinski⁵⁵,
 Heinz Vincke⁴⁴, Helmut Vincke⁴⁴, C. Visone^{14,d}, K. Vlasik³⁸, A. Volkov^{32,33},
 R. Voronkov³², S. van Waasen⁹, R. Wanke¹⁰, P. Wertelaers⁴⁴, O. Williams⁴⁴,
 J.-K. Woo²⁴, M. Wurm¹⁰, S. Xella³, D. Yilmaz⁴⁹, A.U. Yilmazer⁴⁹,
 C.S. Yoon²², Yu. Zaytsev³⁰, A. Zelenov³⁶, J. Zimmerman⁶

¹ Faculty of Physics, Sofia University, Sofia, Bulgaria

² Universidad Técnica Federico Santa María and Centro Científico Tecnológico de Valparaíso, Valparaíso, Chile

³ Niels Bohr Institute, University of Copenhagen, Copenhagen, Denmark

⁴ LAL, Univ. Paris-Sud, CNRS/IN2P3, Université Paris-Saclay, Orsay, France

⁵ LPNHE, IN2P3/CNRS, Sorbonne Université, Université Paris Diderot, F-75252 Paris, France

⁶ Humboldt-Universität zu Berlin, Berlin, Germany

⁷ Physikalisches Institut, Universität Bonn, Bonn, Germany

⁸ Universität Hamburg, Hamburg, Germany

⁹ Forschungszentrum Jülich GmbH (KFA), Jülich, Germany

¹⁰ Institut für Physik and PRISMA Cluster of Excellence, Johannes Gutenberg Universität Mainz, Mainz, Germany

¹¹ Sezione INFN di Bari, Bari, Italy

¹² Sezione INFN di Bologna, Bologna, Italy

¹³ Sezione INFN di Cagliari, Cagliari, Italy

¹⁴ Sezione INFN di Napoli, Napoli, Italy

¹⁵ Laboratori Nazionali dell'INFN di Frascati, Frascati, Italy

- ¹⁶ *Laboratori Nazionali dell'INFN di Gran Sasso, L'Aquila, Italy*
- ¹⁷ *Aichi University of Education, Kariya, Japan*
- ¹⁸ *Kobe University, Kobe, Japan*
- ¹⁹ *Nagoya University, Nagoya, Japan*
- ²⁰ *College of Industrial Technology, Nihon University, Narashino, Japan*
- ²¹ *Toho University, Funabashi, Chiba, Japan*
- ²² *Physics Education Department & RINS, Gyeongsang National University, Jinju, Korea*
- ²³ *Gwangju National University of Education^e, Gwangju, Korea*
- ²⁴ *Jeju National University^e, Jeju, Korea*
- ²⁵ *Korea University, Seoul, Korea*
- ²⁶ *Sungkyunkwan University^e, Suwon-si, Gyeong Gi-do, Korea*
- ²⁷ *University of Leiden, Leiden, The Netherlands*
- ²⁸ *LIP, Laboratory of Instrumentation and Experimental Particle Physics, Portugal*
- ²⁹ *Joint Institute for Nuclear Research (JINR), Dubna, Russia*
- ³⁰ *Institute of Theoretical and Experimental Physics (ITEP) NRC "Kurchatov Institute", Moscow, Russia*
- ³¹ *Institute for Nuclear Research of the Russian Academy of Sciences (INR RAS), Moscow, Russia*
- ³² *P.N. Lebedev Physical Institute (LPI RAS), Moscow, Russia*
- ³³ *National Research Centre "Kurchatov Institute", Moscow, Russia*
- ³⁴ *National University of Science and Technology "MISIS", Moscow, Russia*
- ³⁵ *Institute for High Energy Physics (IHEP) NRC "Kurchatov Institute", Protvino, Russia*
- ³⁶ *Petersburg Nuclear Physics Institute (PNPI) NRC "Kurchatov Institute", Gatchina, Russia*
- ³⁷ *St. Petersburg Polytechnic University (SPbPU)^f, St. Petersburg, Russia*
- ³⁸ *National Research Nuclear University (MEPhI), Moscow, Russia*
- ³⁹ *Skobel'syn Institute of Nuclear Physics of Moscow State University (SINP MSU), Moscow, Russia*
- ⁴⁰ *Yandex School of Data Analysis, Moscow, Russia*
- ⁴¹ *Institute of Physics, University of Belgrade, Serbia*
- ⁴² *Stockholm University, Stockholm, Sweden*
- ⁴³ *Uppsala University, Uppsala, Sweden*
- ⁴⁴ *European Organization for Nuclear Research (CERN), Geneva, Switzerland*
- ⁴⁵ *University of Geneva, Geneva, Switzerland*
- ⁴⁶ *École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland*
- ⁴⁷ *Physik-Institut, Universität Zürich, Zürich, Switzerland*
- ⁴⁸ *Middle East Technical University (METU), Ankara, Turkey*
- ⁴⁹ *Ankara University, Ankara, Turkey*
- ⁵⁰ *H.H. Wills Physics Laboratory, University of Bristol, Bristol, United Kingdom*
- ⁵¹ *STFC Rutherford Appleton Laboratory, Didcot, United Kingdom*
- ⁵² *Imperial College London, London, United Kingdom*
- ⁵³ *University College London, London, United Kingdom*
- ⁵⁴ *University of Warwick, Warwick, United Kingdom*
- ⁵⁵ *Taras Shevchenko National University of Kyiv, Kyiv, Ukraine*
- ^a *Università di Bari, Bari, Italy*
- ^b *Università di Bologna, Bologna, Italy*
- ^c *Università di Cagliari, Cagliari, Italy*
- ^d *Università di Napoli "Federico II", Napoli, Italy*
- ^e *Associated to Gyeongsang National University, Jinju, Korea*
- ^f *Associated to Petersburg Nuclear Physics Institute (PNPI), Gatchina, Russia*
- ^g *Also at Moscow Institute of Physics and Technology (MIPT), Moscow Region, Russia*
- ^h *Consorzio CREATE, Napoli, Italy*
- ⁱ *Università della Basilicata, Potenza, Italy*
- ^l *Università di Napoli Parthenope, Napoli, Italy*