

Report of the RCNP Collaboration Research Network (RCNP-COREnet)		
COREnet040		PI: FUKUDA Yuji
1	Title of research	Development of scintillator-based multi-pixel detection system for laser accelerated multi-GeV ions
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3	Period of research	June 2022 - March 2024
4	Main location of collaboration implementation	Kansai Institute for Photon Science (KPSI), QST
5	Publication list (Please include DOI if available)	Articles
		T. Taguchi, T. Minami, T. Hihara, F. Nikaido, T. Asai, K. Sakai, Y. Abe, A. Yogo, Y. Arikawa, H. Kohri, A. O. Tokiyasu, C. M. Chu, W. Y. Woon, S. Kodaira, M. Kanasaki, Y. Fukuda, Y. Kuramitsu, Automation of etch pit analyses on solid-state nuclear track detectors with machine learning for laser-driven ion acceleration, Rev. Sci. Instrum. 95, 033301 (2024). I. Yu. Skobelev, S. N. Ryazantsev, R. K. Kulikov, M. V. Sedov, E.D. Filippov, S. A. Pikuz, T. Asai, M. Kanasaki, T. Yamauchi, S. Jinno, M. Ohta, S. Egashira, K. Sakai, T. Minami, Y. Abe, A. Tokiyasu, H. Kohri, Y. Kuramitsu, Y. Sakawa, Y. Miyasaka, Ko. Kondo, A. Kon, A. Sagisaka, K. Ogura, A. Pirozhkov, M. Kando, H. Kiriyaama, T. Pikuz, Y. Fukuda, The Role of Collision Ionization of K-Shell Ions in Nonequilibrium Plasmas Produced by the Action of Super Strong, Ultrashort PW-Class Laser Pulses on Micron-Scale Argon Clusters with Intensity up to 5×10^{21} W/cm², Photonics 10, 1250 (2023). Y. Kuramitsu, T. Taguchi, F. Nikaido, T. Minami, T. Hihara, S. Suzuki, K. Oda, K. Kuramoto, T. Yasui, Y. Abe, K. Ibano, H. Takabe, C.M. Chu, K.T. Wu, W. Y. Woon, S. H. Chen, C. S. Jao, Y. C. Chen, Y. L. Liu, A. Morace, A. Yogo, Y. Arikawa, H. Kohri, A. Tokiyasu, S. Kodaira, T. Kusumoto, M. Kanasaki, T. Asai, Y. Fukuda, Ko. Kondo, H. Kiriyaama, T. Hayakaya, S. Tanaka, S. Isayama, N. Watamura, H. Suzuki, H. S. Kumar, N. Ohnishi, T. Pikuz, E. Filippov, K. Sakai, R. Yasuhara, M. Nakata, R. Ishikawa, A. Mizuta, N. Bolouki, N. Saura, S. Benkadda, M. Koenig, and S. Hamaguchi, Optimization of laser-driven quantum beam generation and the applications with artificial intelligence, accepted for publication in Phys. Plasmas (2024)
		Talks
		Y. Abe, H. Kohri, A. Tokiyasu, T. Minami, K. Oda, T. Yasui, Y. Sakai, K. Sakai, F. Nikaido, K. Kuramoto, K. Iwasaki, T. Taguchi, T. Asai, M. Kanasaki, S. Kodaira, S. Fujioka, S. Tanaka, S. Isayama, Y. Fukuda, and Y. Kuramitsu, A multi-channel scintillation counter for GeV-scale multi-species ion spectroscopy in laser-driven particle acceleration experiments, The 7th Asia-Pacific Conference on Plasma Physics (AAPPs-DPP2023), 2023-11-14 (invited) 諫山翔伍, 安部勇輝, 蔵満康浩, 南 卓海, 境健太郎, 田口智也, 小田和昌, 鈴木蒼一朗, 二階堂颯佳, 倉本恭誓, 安井稔暉, 酒井優一, 兼安祐実, 山ノ井航平, 福田祐仁, 今 亮, 桐山博光, 近藤康太郎, 陳 仕宏, 金崎真聡, 浅井孝文, 田中周太, 小平 聡, 時安敦史, 郡 英輝, 超高強度レーザーを用いたイオン航跡場加速, レーザー学会学術講演会第44回年次大会, 2024-01-17. (invited)

		安井稔遥, 安部勇輝, 郡 英輝, 時安敦史, 金崎真聡, 田中周太, 諫山翔伍, 南 卓海, 境健太郎, 浅井孝文, 田口智也, 姫野公輔, 小田和昌, 鈴木蒼一郎, 二階堂颯佳, 倉本恭誓, 酒井優一, 田中崇寛, Zechen Lan, 余語覚文, 小平 聡, 早川 岳人, 福田 祐仁, 蔵満 康浩, レーザーイオン加速実験における多層シンチレータを用いた高エネルギーイオン計測、日本物理学会 2023年秋季大会, 2023-09-19. 諫山翔伍, 安部勇輝, 蔵満康浩, 南 卓海, 境健太郎, 田口智也, 小田和昌, 鈴木蒼一郎, 二階堂颯佳, 倉本恭誓, 安井稔遥, 酒井優一, 兼安祐実, 山ノ井航平, 福田祐仁, 今 亮, 桐山博光, 近藤康太郎, 陳 仕宏, 金崎真聡, 浅井孝文, 田中周太, 小平 聡, 時安敦史, 郡 英輝, RFフォームターゲットを用いたプロトンの航跡場加速の実証, 日本物理学会 2023年秋季大会, 2023-09-19.
6	Description of the results and outputs	In FY 2023, we conducted time-resolved measurements using the multi-pixel detector with sub-GeV class well-characterized ion beams from the HIMAC at QST on June 2023 and confirmed that highly accurate time-of-flight (TOF) measurements were possible even with a multi-pixel configuration. By combining a multi-pixel liquid scintillator with a multi-channel semiconductor photomultiplier (SiPM) and a VME standard high-speed digitizer (up to 10 GS/s), the entire time history of the signals output from each channel was recorded. The flight times and wave height values of individual particles were analyzed in post-processing. Detailed data analysis is now going on.
7	Amount of budget implemented (for internal use only)	280,668 yen
8	Requests or comments for improvement of the COREnet program (for internal use only)	We greatly acknowledge the support from the COREnet program.