

HSTD12 - Development and Application of Semiconductor Tracking Detectors

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TOPICS:
Simulations
Technologies
Pixel and Strip Sensors
Radiation Tolerant Materials
ASICs
Large Scale Applications
Applications in Biology, Astrophysics, Medicine, ...
New Ideas and Future Applications

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Nicoló Cartiglia D-20-00116
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Editorial

The 12th International “Hiroshima” Symposium on the Development and Application of Semiconductor Tracking Detectors (HSTD12) was held on December 15 - 18, 2017, at the International Conference Center Hiroshima, Hiroshima, Japan. The primary goal of the symposium is to bring together experts in the design, processing and applications for discussions of experiences, lessons learned and new ideas which are still in the early stage of development. The series of “Hiroshima” symposia has been held traditionally in the Pacific Rim region since the first symposium at Hiroshima in 1993. The proceedings of the symposia were published in Nuclear Instruments and Methods [1, 2, 4, 5, 6, 7, 8, 9, 10, 11].

To the 12th symposium, a total number of 163 participants were registered with 143 contributions, among which 55 were assigned to the oral presentations and 88 to the posters. The topics of the contributions covered the field of semiconductor detectors and related area, from technologies and simulations (10 and 2 contributions, respectively), pixel sensors for tracking and imaging (24 and 14), strip sensors (10), radiation damage and radiation tolerant materials (20 total), ASICs (20), large scale application in the experiments of particle physics (14), applications in astrophysics, biology, medicine, etc. (12 total), and new ideas and future applications (14 total). Following the tradition, the oral sessions were only plenary, and the posters throughout the entire symposium for presentation and discussion, with coffee, tea, and cookies, during the coffee/tea/lunch breaks.

In the past symposia, we were witnessing development of silicon-based tracking devices. Fig. 1 is a plot of such evolution. The first wave of the evolution is of the strip sensors, which is followed by the second wave of the pixel sensors. In this symposium, we have witnessed a birth of silicon-based fast timing detectors in large-scale application, in ATLAS and CMS experiments, that will be operational in the middle of 2020’s.

The symposium was entertained with a welcome reception in the Conference Center in the evening of 14th, Saturday, and with a half-day break, in the afternoon of 16th, Monday, used for an excursion to Miyajima island where a world-heritage Itsukushima shrine and the sacred mountain “Misen” are, and with the symposium dinner, in the evening of 17th at Hiroshima-city Bunka Koryu Kaikan. The dinner was entertained with the “Kagura” (dance in dedication to gods) dancing by the dancing team “Saniwa Kagura-Dan”, provided by Hiroshima Convention & Visitors Bureau. The program was “Yamata no Orochi” which was a story of a god who saved the life of daughter of old man and wife, who were to be sacrificed to the eight-headed big snake (which were embodied by three snakes in the dance) unless otherwise the god charmed the snake to sleep with “sake” and defeated.

The symposium was supported by Hiroshima Convention & Visitors Bureau, through Ms. A. Sawada of MICE promotion department, in part covering the fee for the Conference Center and with a welcome message from the mayor of Hiroshima City, in addition to the entertainment at the dinner. The symposium was made possible by the excellent contributions of the local organizers, Profs. H. Takahashi and T. Mizuno of Hiroshima University, not only for managing and executing the symposium but also for complementing a guest editor, Y. Fukazawa.

Among the 143 contributions, 109 papers were included for publication in this proceedings. The papers were peer-reviewed with the help of many anonymous reviewers in the field, as same as previous issues, and of a special guest editor, D. Bortoletto, in case of conflict of interest of the managing guest editor, to which the organizers wish to extend their appreciation. We also appreciate the support of the publisher’s editorial team: V. Letizia, L. Li, S. Vikram, and else.

The next Symposium will be held at Vancouver, Canada, in 2022¹.

Guest Editors

References

- | | |
|--|---|
| 79 [1] 1993 Hiroshima (Nucl. Instr. Meth. A342, 1-308, 1994) | 84 [6] 2006 Carmel (Nucl. Instr. Meth. A579, 557-914, 2007) |
| 80 [2] 1995 Hiroshima (Nucl. Instr. Meth. A383, 1-266, 1996) | 85 [7] 2009 Hiroshima (Nucl. Instr. Meth. A636 Supplement 1, S1-S256, 2011) |
| 81 [3] 1997 Melbourne | 86 [8] 2011 Taipei (Nucl. Instr. Meth. A699, 1-250, 2013) |
| 82 [4] 2000 Hiroshima (Nucl. Instr. Meth. A466, 243-428, 2003) | 87 [9] 2013 Hiroshima (Nucl. Instr. Meth. A765, 1-296, 2014) |
| 83 [5] 2004 Hiroshima (Nucl. Instr. Meth. A541, 1-466, 2005) | 88 [10] 2015 Xi’an (Nucl. Instr. Meth. A831, 1-448, 2016). |
| | 89 [11] 2017 Okinawa (Nucl. Instr. Meth. A924, 1-484, 2019) |

¹Due to the pandemic of new corona virus (COVID-19), the 13th symposium is postponed by one year, from 2021 to 2022.

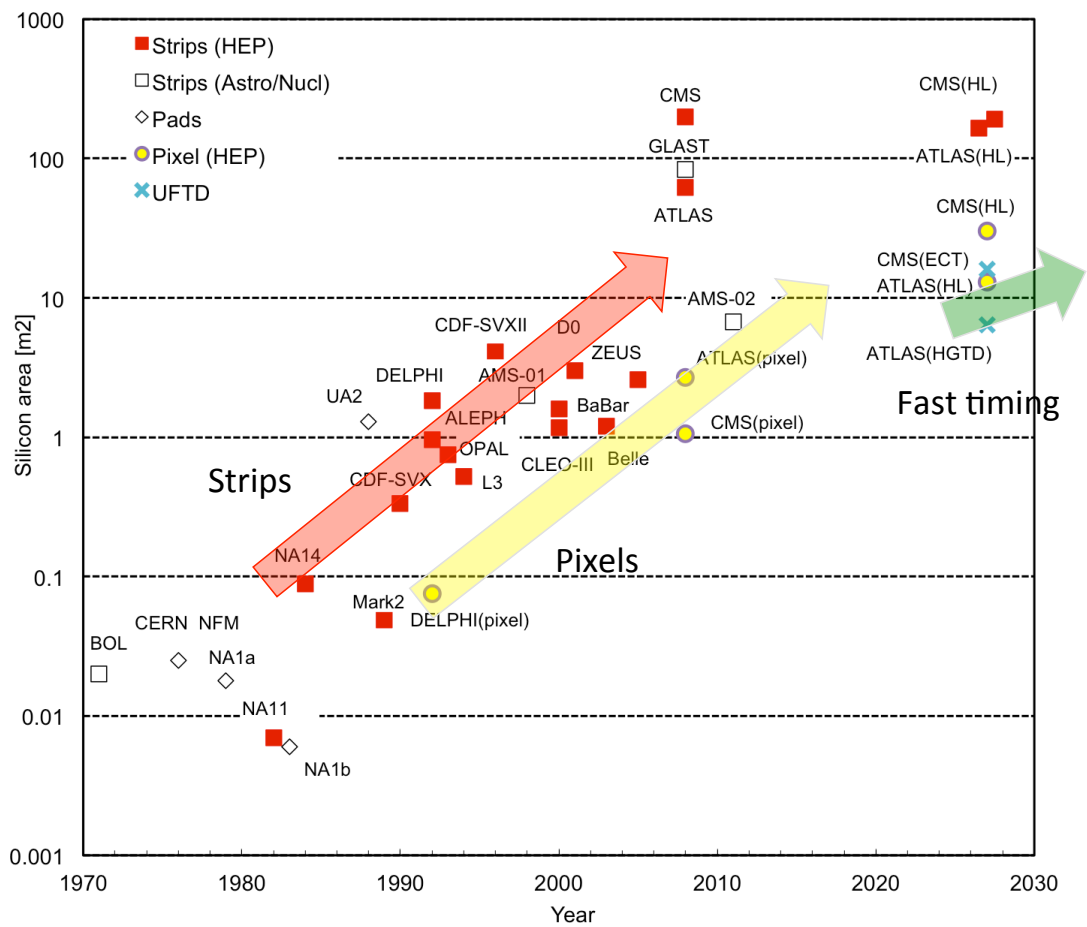


Fig. 1: Evolution of area of the silicon-based detectors. The first wave is the strips, followed by the second wave of pixels. The new is the birth of fast timing detectors with large-scale applications.

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Yutaro Sato	High Energy Accelerator Research Organization
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Hiromitsu Takahashi	Hiroshima University
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Symposium Photos



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on the step of "the relief" of Conference Center



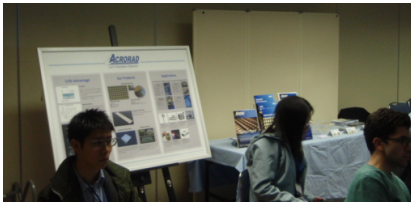
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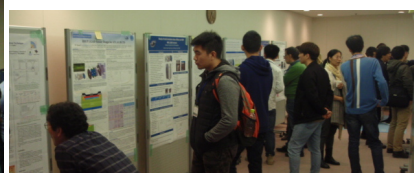
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sessions

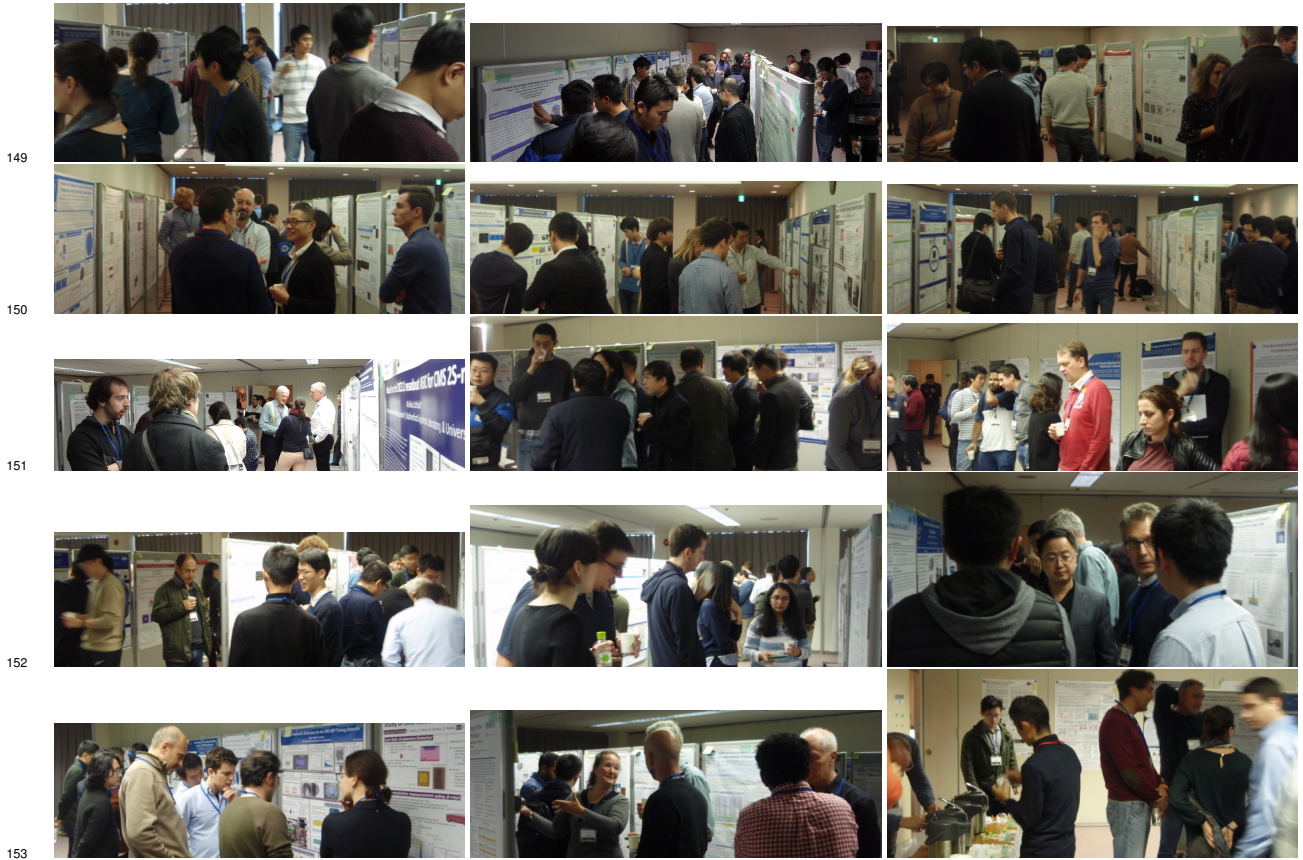


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posters all though the symposium



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posters all though the symposium, with coffee/tea/cookies



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Peace Memorial Park in the dusk, Conference Center at left-most



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welcome party in the eve of Symposium



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the excursion: the boat, the shrine, the town



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at the vista point of "Lion's nose" of the mount "Misen", with the scenery of Hiroshima city in the background



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Symposium dinner at Hiroshima City Bunka Kouryu Kaikan



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happy faces



the entertainment: "Kagura" (dance in dedication to gods), "Yamata no Orochi", and aftermath



Symposium dinner opening and closing by the founders of the symposium