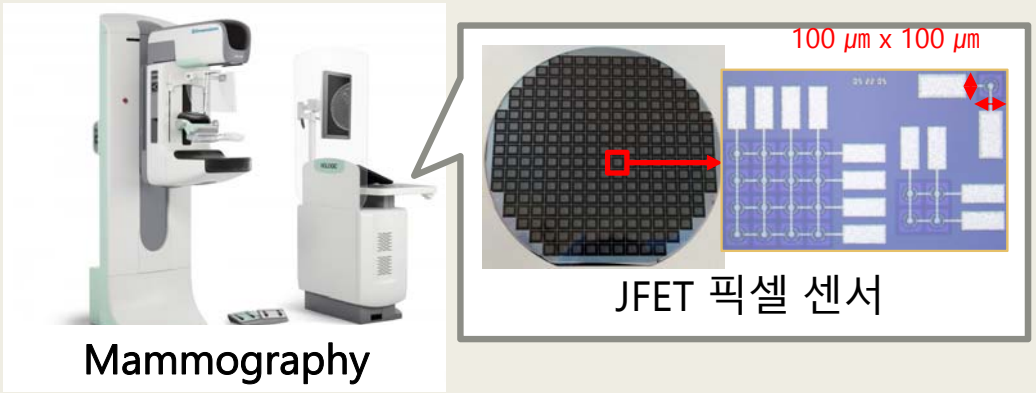
SILICON DETECTOR R&D
:실리콘 반도체 검출기 연구실

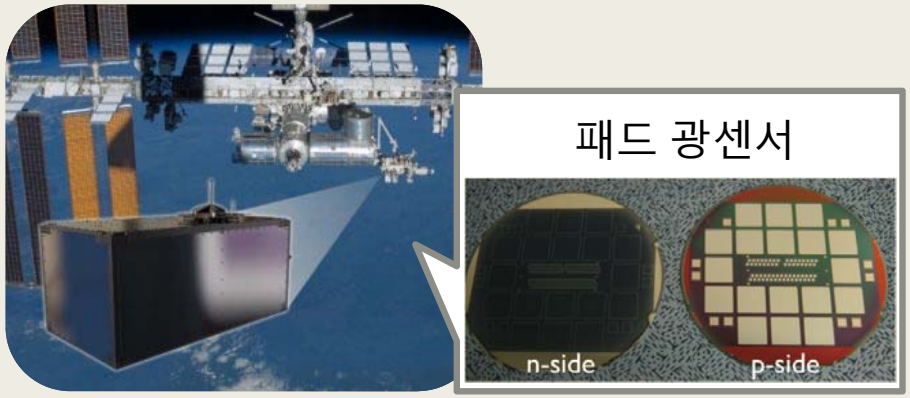
박사과정 백종민

하전 입자, 광자 등 입자 검출 → 이미징, 입자 궤적 및 버텍스 측정

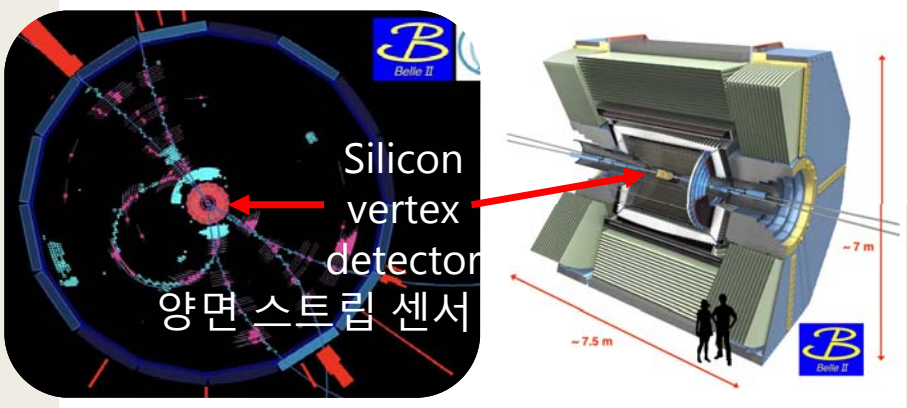
항만용 X-ray 컨테이너 검색기



의학용 이미지 센서



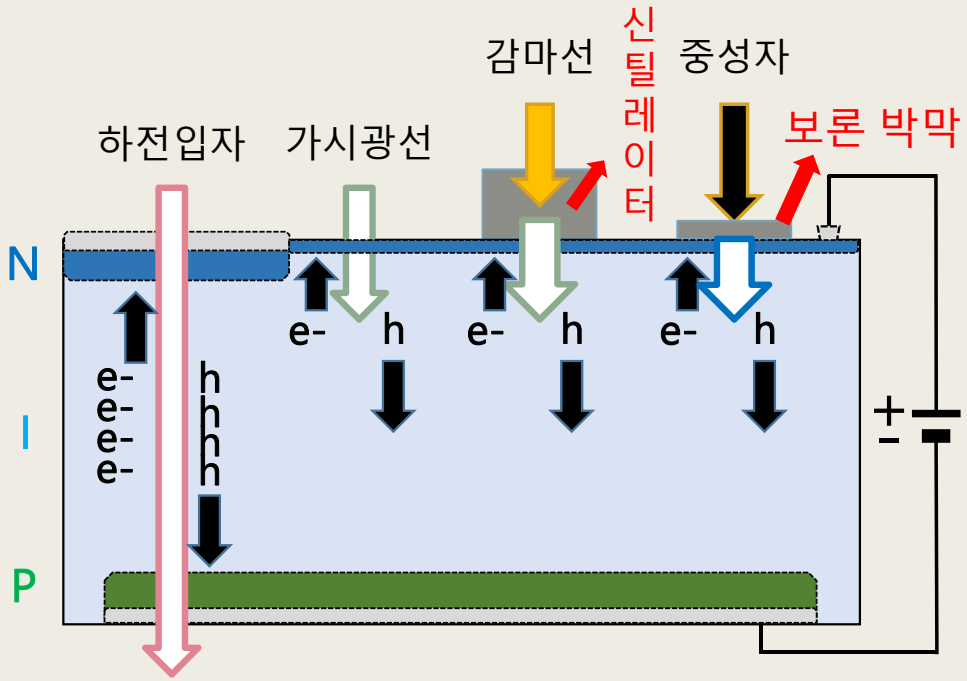
천체 물리학: 우주선 측정



고에너지 물리학: 궤적/버텍스 관측

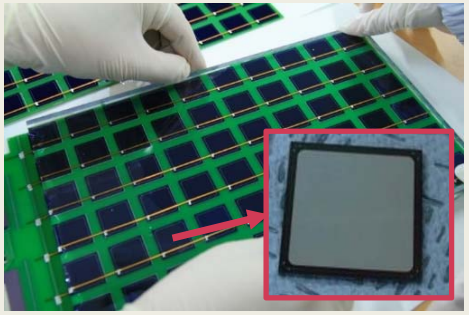
실리콘 반도체 검출기

■ 센서 기본 구조: P-I-N

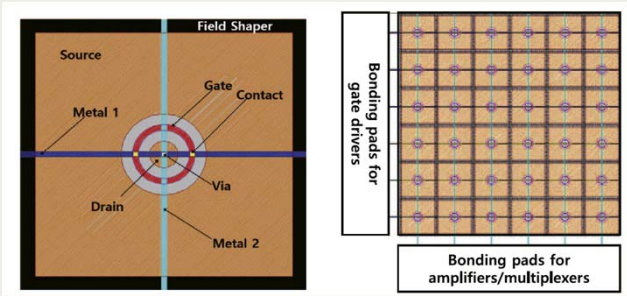


실리콘 검출기 고유의 장점
+ 다양한 변환 물질과 결합 가능
→ 뛰어난 범용성

■ 종류



단일 패드 센서



픽셀 센서

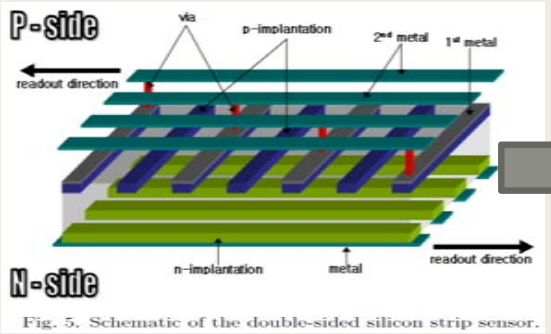
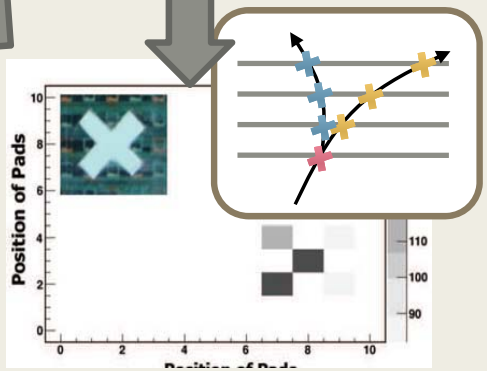


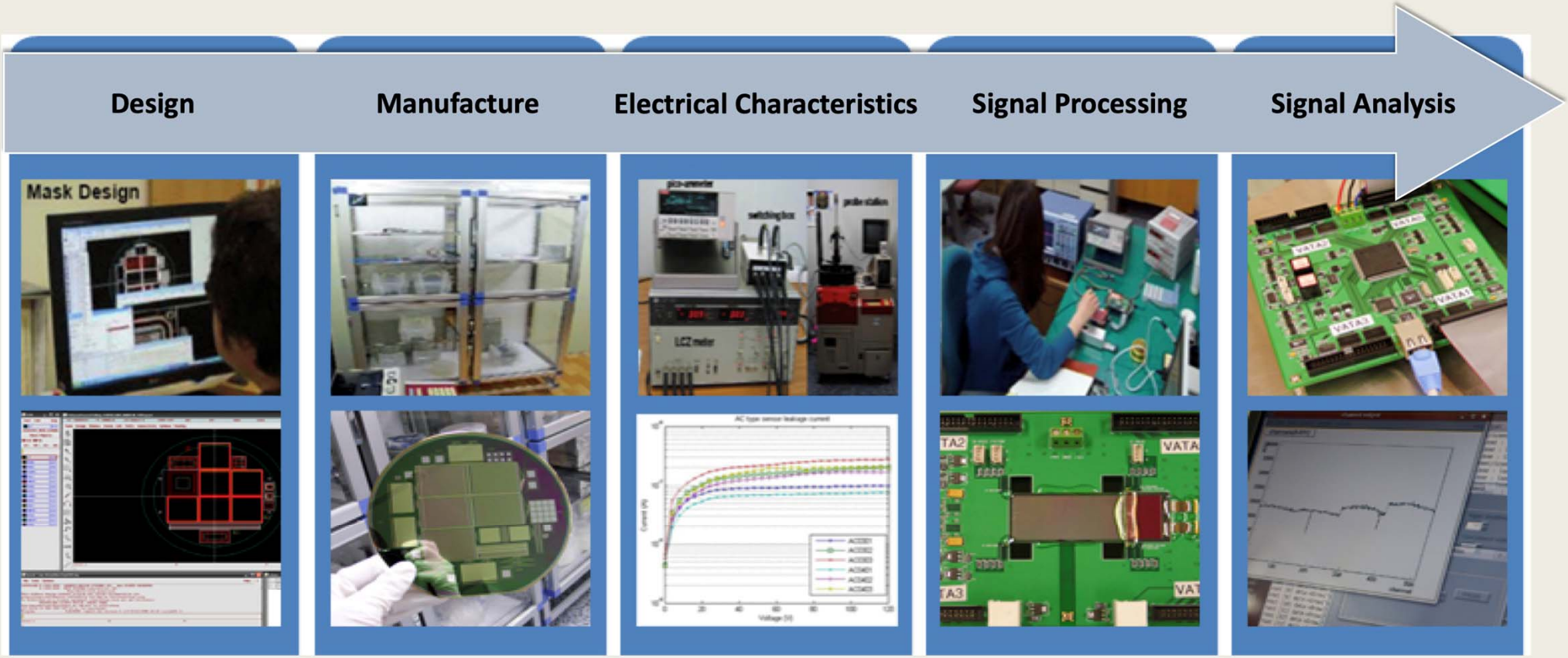
Fig. 5. Schematic of the double-sided silicon strip sensor.

스트립 센서



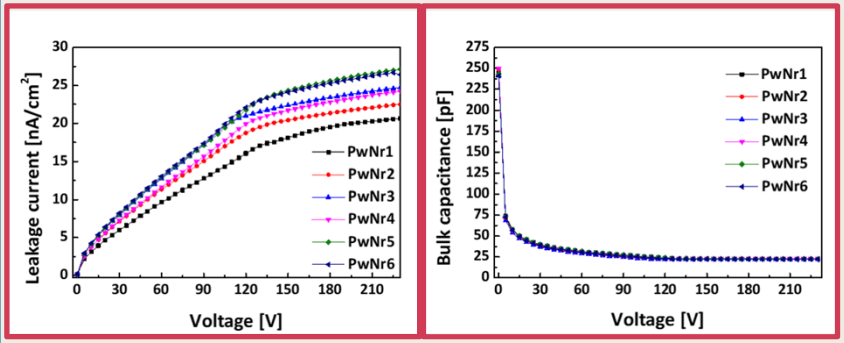
2D 위치 정보 획득

실리콘 반도체 검출기 개발 과정

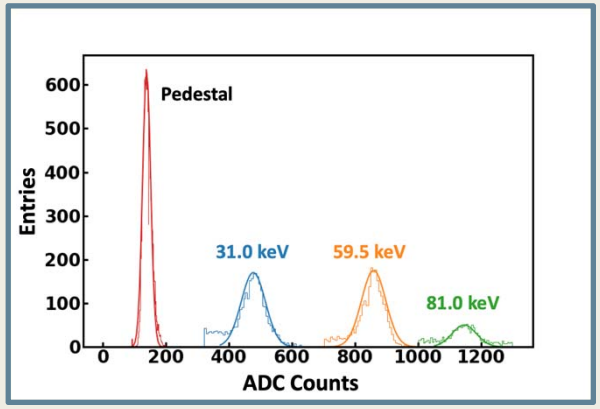


- Mask manufacture : PKL (Photomask Manufacture Institute, Cheonan in Korea)
- Sensor manufacture : ETRI (Electronics and Telecommunications Research Institute, Daejeon in Korea)
- Quantum efficiency measurement : KRISS (Korea Research Institute of Standards and Science, Daejeon in Korea)

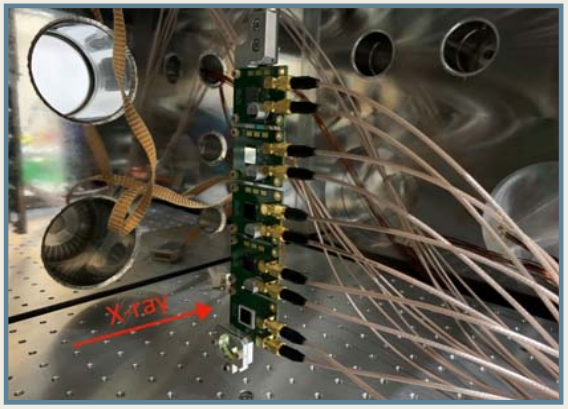
포항가속기연구소 빔 포지셔닝용 광센서 개발



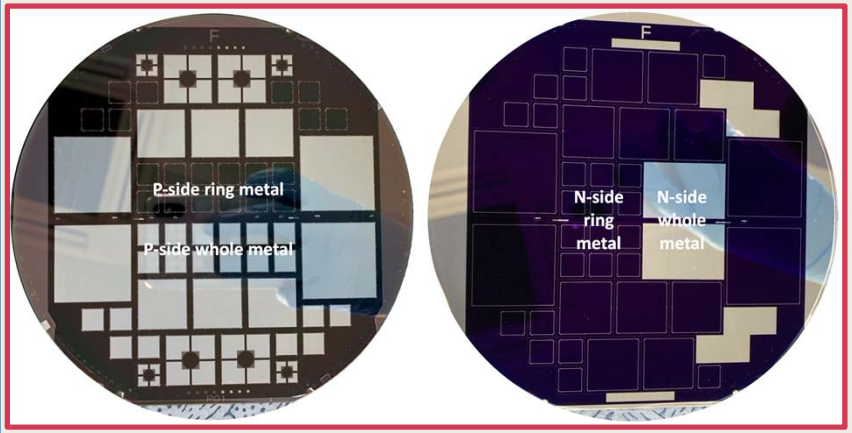
1차공정 센서의 성능검사



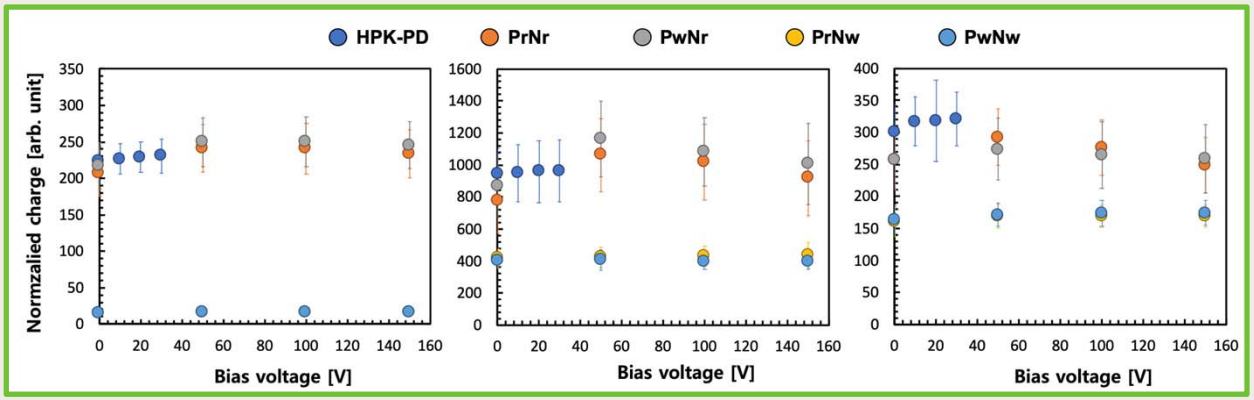
X-ray 선원 테스트



PAL-XFEL 빔테스트

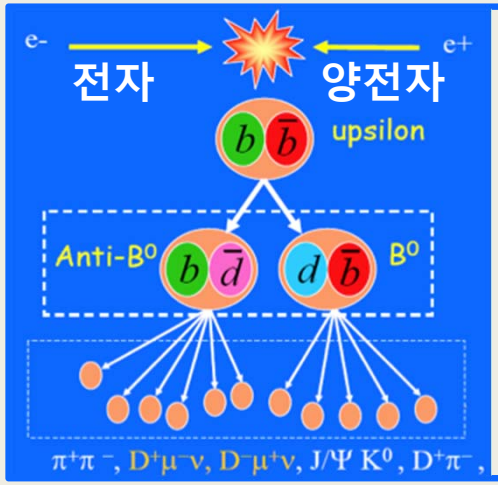


공정이 완료된 1차공정 센서들



PAL-XFEL 빔테스트 결과

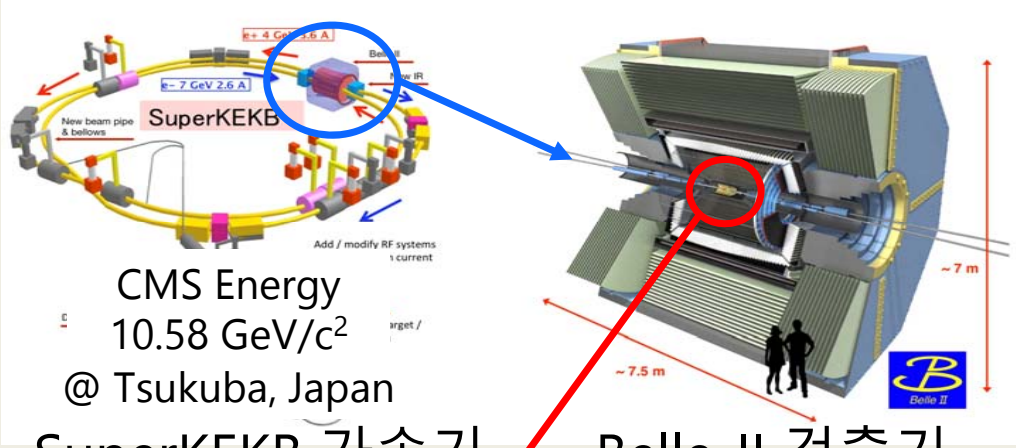
Belle/Belle-II 실험



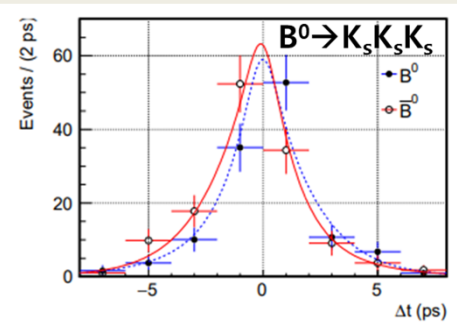
전자-양전자 충돌

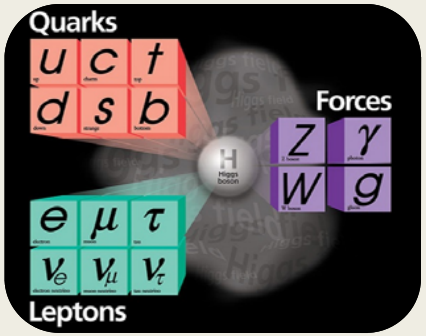
B 중간자 쌍 생성

B 중간자 붕괴 관측



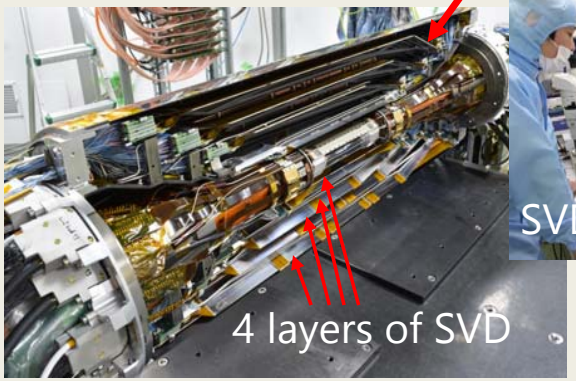
SuperKEKB 가속기 Belle-II 검출기





표준 모형 정밀 검증, 새로운 물리 현상 관측

획득한 데이터 분석



Silicon Vertex Detector (SVD) 연구 및 제작

실리콘 반도체 검출기 연구실#108

박환배 교수님

박사 과정

이승철

백종민

현재 연구 내용

- Belle, Belle II 실험 데이터를 이용한 $B^0 \rightarrow K_s K_s \gamma$ 희귀 붕괴 모드 분석
- 의료용 이미징을 위한 JFET 스위치를 포함하는 픽셀 센서 개발
- 포항가속기연구소 방사광 빔 포지셔닝을 위한 광센서 개발