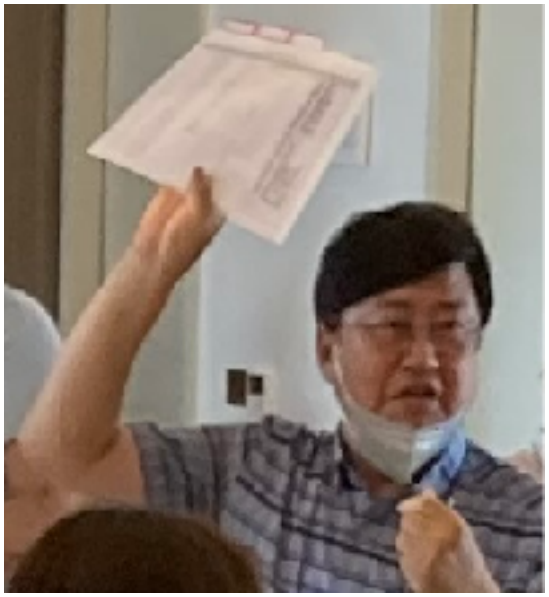
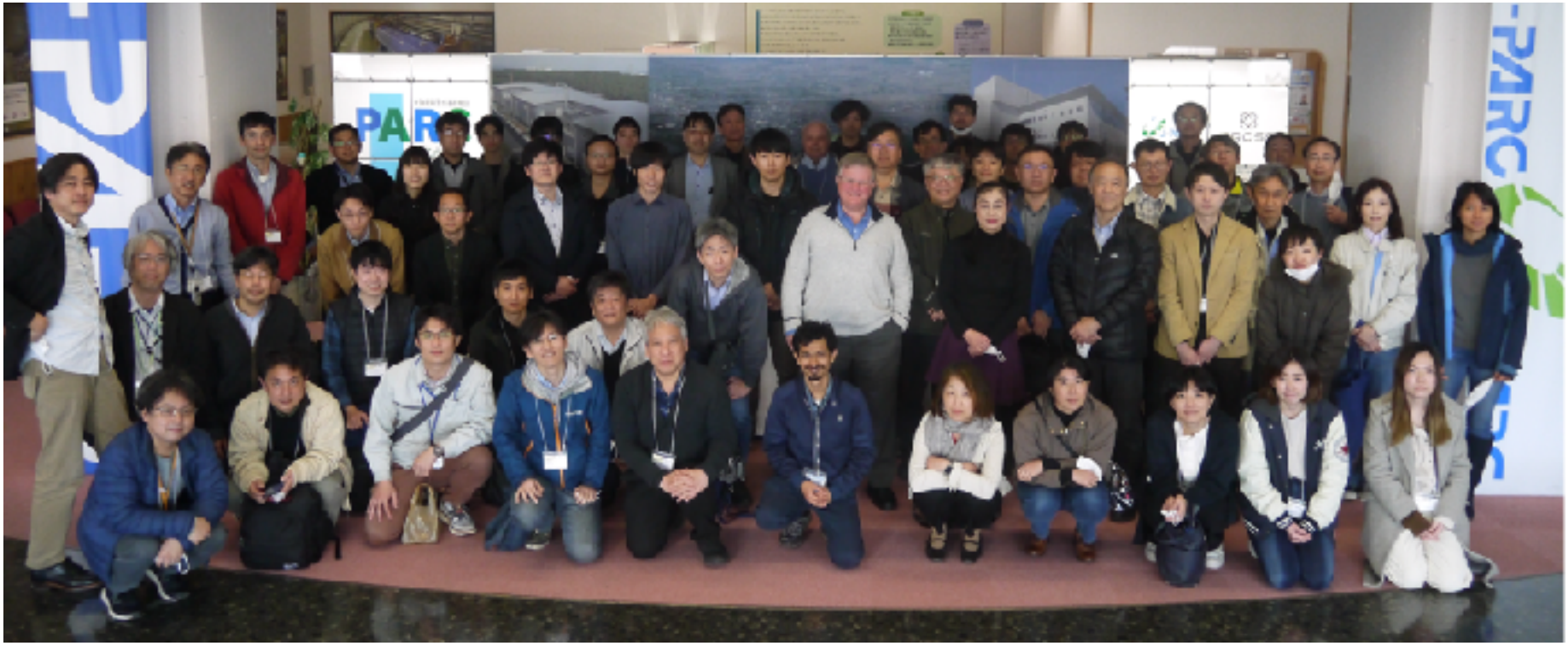
Physics and person
— for the memory of Yongseok —



At the Departure of boat trip
July 13, 2022
@Jeju

Atsushi Hosaka
Research Center for Nuclear Physics (**RCNP**)
Osaka University
and
Advanced Science Research Center (**ASRC**)
Japan Atomic Energy Agency

March 14, 2023, J-PARC, Tokai



One of leading projects of hadron physics at J-PARC

Kbar-N scattering for Ξ production

Yongseok Oh (Kyungpook National University, Korea)

3rd International Workshop on the Extension Project for the J-PARC Hadron Experimental Facility
2023. 3. 14 - 3.16, J-PARC, Tokai, Japan

April 5, 11:35
Mail from Jafar Arifi (RIKEN), a former postdoc of Yongseok

Soon after: I told this to Takashi Nakano

12:06
I contacted Hyun-Chul Kim.

12:31
I forwarded the news to Japanese community.
Responded from Hiyama, Harada, Hatsuda, Tanida, Sawada, Oka, Nakano, Suzuki, Geng, ….

13:31
I contacted Wooyoung Kim

April 10, Morning
He arrived at Incheon

April 11
Funeral

Physics: Structure and reactions 1990 ~

- Skyrmions: heavy baryons

  Massive quark baryons as skyrmions: Magnetic moments
  Nucl.Phys.A 534 (1991) 493-512
  Pentaquark exotic baryons in the Skyrme model
  Phys.Lett.B 331 (1994) 362-370
  Heavy quark symmetry and skyrmions
  Int.J.Mod.Phys.E 4 (1995) 47-122
  …..

  AH:
  Chiral bag model

- Hadron reactions: Photo-induced…

  Polarization observables in phi meson photoproduction and the strangeness content of the proton, Phys.Rev.Lett. 79 (1997) 1634-1637
  Nucleon resonances in omega photoproduction
  Phys.Rev.C 63 (2001) 025201
  Exotic Theta+ baryon production induced by photon and pion
  Phys.Rev.D 69 (2004) 014009

  AH:
  Hyperon productions

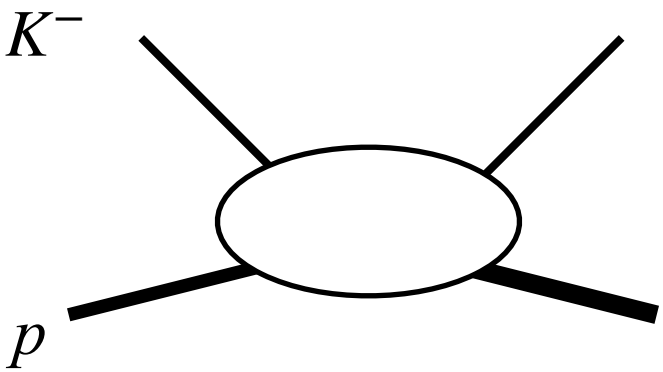
Recent wide interests

EFT for nuclear structure, Machine learning
Light-front model for structure, Two meson productions
Nuclear Matter, Neutron stars, Hadrons with strangeness
…..

Started from the theory of hadron (resonances) structure
Wished to test by experiments → Reactions

Studies of resonance structures by reactions
→ complete understanding of
Non-trivial structures and interactions of hadrons

Multi-strangeness spectroscopy



Planned at J-PARC
Extension of the J-PARC Hadron Experimental Facility: Third White Paper, e-Print: 2110.04462 [nucl-ex]

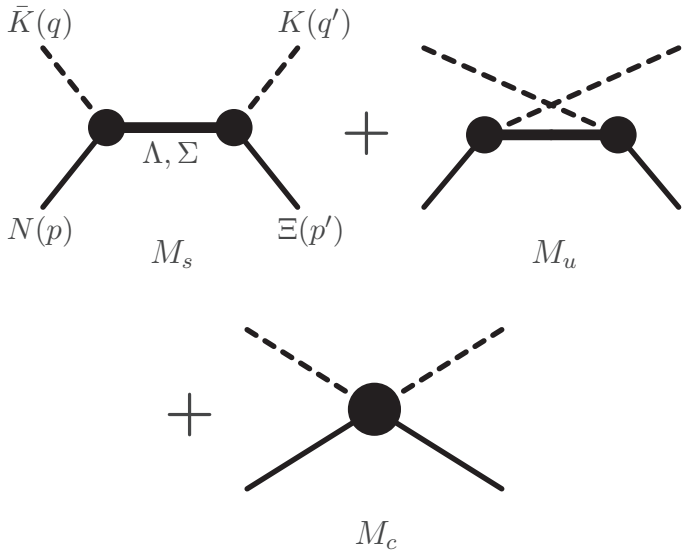
$\Xi, \Xi^*, \ldots \longrightarrow K^+\Omega^-, \ldots$

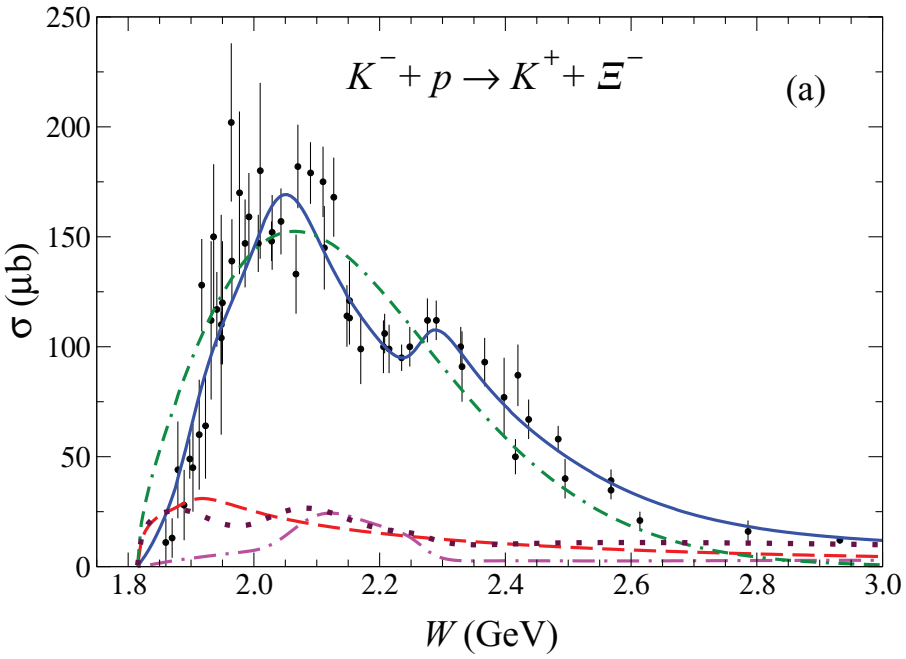
PHYSICAL REVIEW C **91**, 065208 (2015)

$\bar{K} + N \to K + \Xi$ reaction and $S = -1$ hyperon resonances

Benjamin C. Jackson,[1] Yongseok Oh,[2,3,*] H. Haberzettl,[4,†] and K. Nakayama[1,5,‡]

Sangin Shim is now working for the extension $\Xi \to \Xi^*$





	Λ states					Σ states			
State	m_r (MeV)	Γ_r (MeV)	Rating	$\lvert g_{N\Lambda K}\rvert$	State	m_r (MeV)	Γ_r (MeV)	Rating	$\lvert g_{N\Sigma K}\rvert$
Λ(1116) 1/2$^+$	1115.7		****		Σ(1193) 1/2$^+$	1193		****	
Λ(1405) 1/2$^-$	1406	50	****		Σ(1385) 3/2$^+$	1385	37	****	
Λ(1520) 3/2$^-$	1520	16	****						
Λ(1600) 1/2$^+$	1600	150	***	4.2	Σ(1660) 1/2$^+$	1660	100	***	2.5
Λ(1670) 1/2$^-$	1670	35	****	0.3	Σ(1670) 3/2$^-$	1670	60	****	2.8
Λ(1690) 3/2$^-$	1690	60	****	4.0	Σ(1750) 1/2$^-$	1750	90	***	0.5
Λ(1800) 1/2$^-$	1800	300	***	1.0	Σ(1775) 5/2$^-$	1775	120	****	
Λ(1810) 1/2$^+$	1810	150	***	2.8	Σ(1915) 5/2$^+$	1915	120	****	
Λ(1820) 5/2$^+$	1820	80	****		Σ(1940) 3/2$^-$	1940	220	***	<2.8
Λ(1830) 5/2$^-$	1830	95	****		Σ(2030) 7/2$^+$	2030	180	****	
Λ(1890) 3/2$^+$	1890	100	****	0.8	Σ(2250) ?$^?$	2250	100	***	
Λ(2100) 7/2$^-$	2100	200	****						
Λ(2110) 5/2$^+$	2110	200	***						
Λ(2350) 9/2$^+$	2350	150	***						

Jeju Falk village, 2014.7.3. (Thu)

Y: My grandparents' house was like this, no electricity, …

Y: Skyrmion calculation is tough, needs hundreds of pages calculations, I got a calluses on fingers

Callan and Klebaonv, BOUND-STATE APPROACH TO STRANGENESS IN THE SKYRME MODEL, Nucl, Phys. B262(1985)365

order in K will vanish as well). The reasonably simple end result of this rather painful exercise is

$$L_{\text{Skyrme}}(U_\pi) + (D_\mu K)^+ D_\mu K - m_K^2 K^+ K \quad + \ldots$$

Yongseok is certainly my best friend in Korea for so many years.
I knew his name when he was working on Skyrmions, because I was also working with the model. But I started to communicate with him often from around 2003, when we started to work on hadron reaction problems.

He did a lot to support our physics activities, because he was one of the APCTP members from the nuclear physics community. One of the events that sticks in my mind is the 10th APCTP-BLTP/JINR-RCNP-RIKEN Joint Workshop on Nuclear and Hadronic Physics in the summer of 2016, which was held at RIKEN. Yongseok proposed to organize the workshop as one of the APCTP leading events, which was successfully realized with strong support by him and APCTP.

During the workshop in Jeju Island in July 2014, we walked together in Jeju Minsokchon. I cannot forget the conversation we had about our family history. I felt and share sympathy with him.
Most recently, in July 2012, when we visited Jeju again for a workshop, he helped us a lot in preparing our visa under the difficult time of corona.
In March 14-16, 2023, just three weeks before, I invited him to the workshop for the J-PARC, Tokai, which unfortunately was the last moment we could talk.

He did a lot in the hadron physics community and I learned a lot from his work and from the conversations with him. This sad fact is a great loss for us.

Yongseok made every effort, with strong mind, wide view, generosity,…
He did a lot, but we have to do more and will.