

Physics world

"What I cannot create, I do not understand." — Richard Feynman

"What I cannot understand, I do not utilize." — Redwoods

"물리는 그냥 안된다.~~ 물리에서는 모든 게 된다." — Giles Sparrow

keywords

atom , genome, bit

- 물리, 물리학 , physics
- 고전물리학
- 열역학
- 전자기학
- 광학
- 현대물리학
- 양자물리학
- 우주론
- 상대성이론

- [교재-구글이북](#)

핵물리학

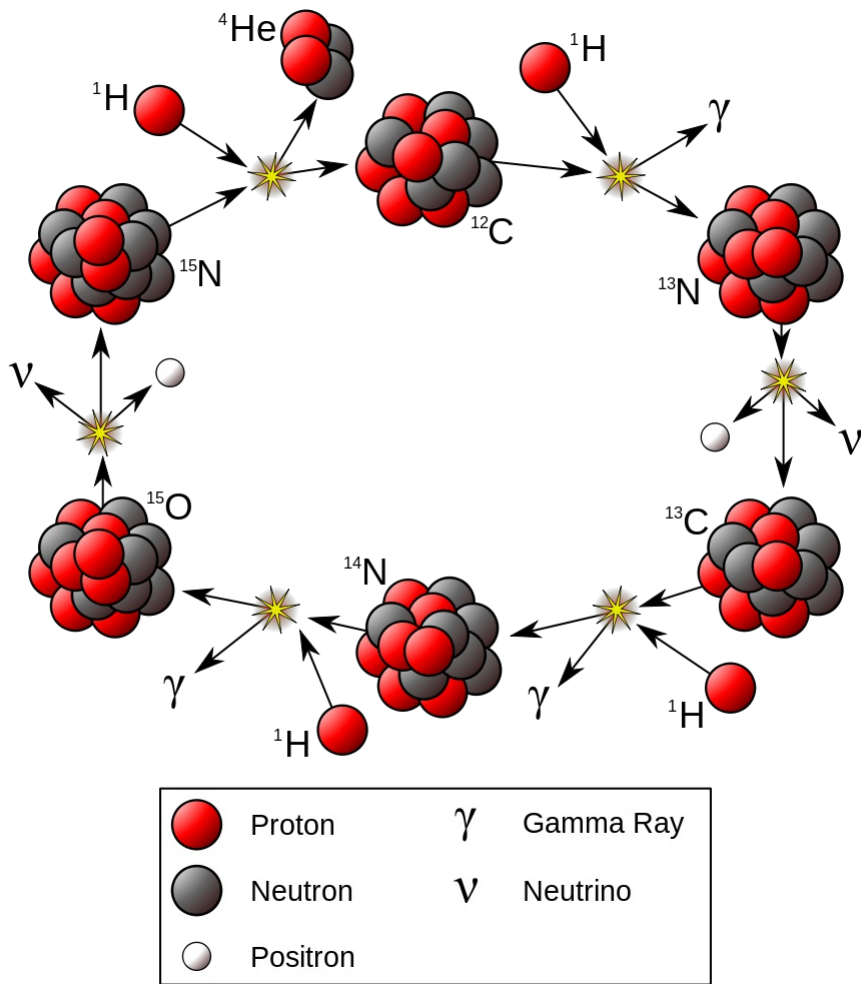
알파붕괴 / 베타붕괴 / 감마선 방출 / 중성미자 / 반감기 / 결합에너지 / (붕괴계열) / (동위원소를 이용한 연대측정법) / 가이거계수기 / 핵분열 에너지 / 핵융합 에너지 / 핵무기

keywords

- 방사능 붕괴
- 중성미자 물리학
- 핵에너지와 원전

핵물리학 (Atomic & Nuclear Physics)

- 원자/원자핵의 안정성과 방사능 붕괴
- 방사선과 방사능 측정
- 핵에너지의 이용



(source: [https://upload.wikimedia.org/wikipedia/commons/thumb/2/21/CNO\\_Cycle.svg/1024px-CNO\\_Cycle.svg.png](https://upload.wikimedia.org/wikipedia/commons/thumb/2/21/CNO_Cycle.svg/1024px-CNO_Cycle.svg.png))

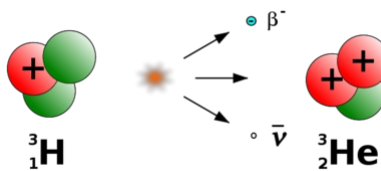
## 알파붕괴

- 불안정한 원소가 헬륨의 원자핵과 안정된 원소로 붕괴.

(source: [https://lh3.googleusercontent.com/proxy/oXsF\\_888NMoN83GCmqsrBYef4JnXORkbBuTpWRPZAKiEel\\_oVeQLGPUO145-V75rQcye4emZTNQJxLouQTdfpBm6ko33qUr7yyulxI3SD8OWV5v2Jv\\_hWXWuTulWP9225f6w0BxIOkAn1YbP4GEw1aCDm9i3Zk5VAH1jKn2Ruu26mbMgvWvWycuHPdpvkTltM7ACYI](https://lh3.googleusercontent.com/proxy/oXsF_888NMoN83GCmqsrBYef4JnXORkbBuTpWRPZAKiEel_oVeQLGPUO145-V75rQcye4emZTNQJxLouQTdfpBm6ko33qUr7yyulxI3SD8OWV5v2Jv_hWXWuTulWP9225f6w0BxIOkAn1YbP4GEw1aCDm9i3Zk5VAH1jKn2Ruu26mbMgvWvWycuHPdpvkTltM7ACYI))

## 베타붕괴

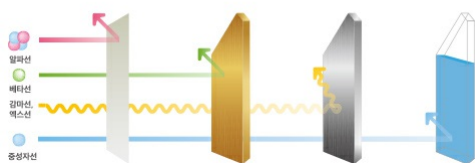
- 핵 내의 중성자가 양성자와 전자로 붕괴.



(source: <https://school.kns.org/wp-content/uploads/2019/05/beta-decay.png>)

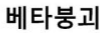
## 감마선 방출

알파선은 헬륨 원자핵의 흐름으로 종이 한장으로도 막을 수 있다. 베타선은 얇은 금속판으로 막을 수 있다. 감마선은 파장이 짧은 전자파로 납이나 철판으로 막을 수 있다. 중성자선은 중성자의 흐름으로 물이나 콘크리트로 막을 수 있다.



(source: [https://www.kaeri.re.kr/resources/images/kaeri/contents/sub04/sub04\\_0503\\_img01\\_2.jpg](https://www.kaeri.re.kr/resources/images/kaeri/contents/sub04/sub04_0503_img01_2.jpg))

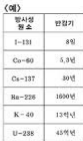
중성미자 (Neutrino)



phinf.pstatic.net/20141218\_139/applepop\_1418908552699IM3ES\_JPEG/%25EB%25B2%25A0%25ED%2583%2580%25EB%25B6%2595%25EA%25B4%25B4.jpg?type=w800)

Youtube: 중성미자

## 반감기 (Half-life)



link: [http://www.seehint.com/catalog/2017/2017\\_10/%EB%B0%A9\\_%EB%B0%98%EA%B0%90%EA%B8%B0.jpg](http://www.seehint.com/catalog/2017/2017_10/%EB%B0%A9_%EB%B0%98%EA%B0%90%EA%B8%B0.jpg)

## 결합에너지

- **핵의 안정성**



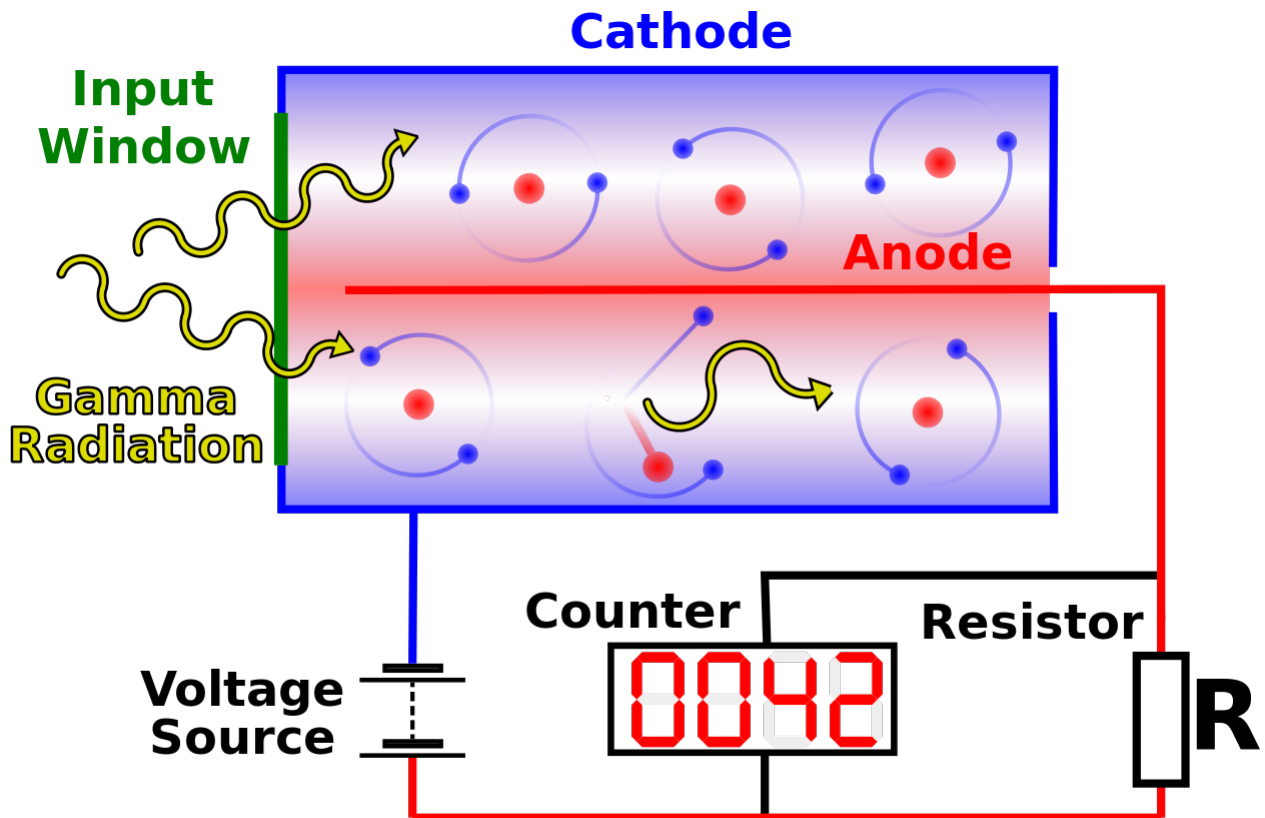
해밀턴

phinf.pstatic.net/201511106\_94/winzone\_14468009298892fFTN\_PNG/%25ED%2595%25B5%25EC%259E%2590%25EB%258B%25B9%25EA%25B2%25B0%25ED%2595%25A9%25EC%2597%25A9%25B0%25B9%25B8%25B7%25B6%25B5%25B4%25B3%25B2%25B1%25B0%25A9%25A8%25A7%25A6%25A5%25A4%25A3%25A2%25A1%25A0%259F%259E%259D%259C%259B%259A%2599%2598%2597%2596%2595%2594%2593%2592%2591%2590%258F%258E%258D%258C%258B%258A%2589%2588%2587%2586%2585%2584%2583%2582%2581%2580%257F%257E%257D%257C%257B%257A%2579%2578%2577%2576%2575%2574%2573%2572%2571%2570%256F%256E%256D%256C%256B%256A%2569%2568%2567%2566%2565%2564%2563%2562%2561%2560%255F%255E%255D%255C%255B%255A%2559%2558%2557%2556%2555%2554%2553%2552%2551%2550%254F%254E%254D%254C%254B%254A%2549%2548%2547%2546%2545%2544%2543%2542%2541%2540%253F%253E%253D%253C%253B%253A%2539%2538%2537%2536%2535%2534%2533%2532%2531%2530%252F%252E%252D%252C%252B%252A%2529%2528%2527%2526%2525%2524%2523%2522%2521%2520%251F%251E%251D%251C%251B%251A%2519%2518%2517%2516%2515%2514%2513%2512%2511%2510%250F%250E%250D%250C%250B%250A%2509%2508%2507%2506%2505%2504%2503%2502%2501%2500%2026%2025%2024%2023%2022%2021%2020%201F%201E%201D%201C%201B%201A%2019%2018%2017%2016%2015%2014%2013%2012%2011%2010%200F%200E%200D%200C%200B%200A%2009%2008%2007%2006%2005%2004%2003%2002%2001%2000%09%08%07%06%05%04%03%02%01%00%5B%5C%5D%5E%5F%60%61%62%63%64%65%66%67%68%69%6A%6B%6C%6D%6E%6F%70%71%72%73%74%75%76%77%78%79%7A%7B%7C%7D%7E%80%81%82%83%84%85%86%87%88%89%8A%8B%8C%8D%8E%8F%90%91%92%93%94%95%96%97%98%99%9A%9B%9C%9D%9E%9F%A0%A1%A2%A3%A4%A5%A6%A7%A8%A9%2597%2596%2595%2594%2593%2592%2591%2590%258F%258E%258D%258C%258B%258A%2589%2588%2587%2586%2585%2584%2583%2582%2581%2580%257F%257E%257D%257C%257B%257A%2579%2578%2577%2576%2575%2574%2573%2572%2571%2570%256F%256E%256D%256C%256B%256A%2569%2568%2567%2566%2565%2564%2563%2562%2561%2560%255F%255E%255D%255C%255B%255A%2559%2558%2557%2556%2555%2554%2553%2552%2551%2550%254F%254E%254D%254C%254B%254A%2549%2548%2547%2546%2545%2544%2543%2542%2541%2540%253F%253E%253D%253C%253B%253A%2539%2538%2537%2536%2535%2534%2533%2532%2531%2530%252F%252E%252D%252C%252B%252A%2529%2528%2527%2526%2525%2524%2523%2522%2521%2520%251F%251E%251D%251C%251B%251A%2519%2518%2517%2516%2515%2514%2513%2512%2511%2510%250F%250E%250D%250C%250B%250A%2509%2508%2507%2506%2505%2504%2503%2502%2501%2500%2026%2025%2024%2023%2022%2021%2020%201F%201E%201D%201C%201B%201A%2019%2018%2017%2016%2015%2014%2013%2012%2011%2010%200F%200E%200D%200C%200B%200A%2009%2008%2007%2006%2005%2004%2003%2002%2001%2000%09%08%07%06%05%04%03%02%01%00%5B%5C%5D%5E%5F%60%61%62%63%64%65%66%67%68%69%6A%6B%6C%6D%6E%6F%70%71%72%73%74%75%76%77%78%79%7A%7B%7C%7D%7E%80%81%82%83%84%85%86%87%88%89%8A%8B%8C%8D%8E%8F%90%91%92%93%94%95%96%97%98%99%9A%9B%9C%9D%9E%9F%A0%A1%A2%A3%A4%A5%A6%A7%A8%A9%2597%2596%2595%2594%2593%2592%2591%2590%258F%258E%258D%258C%258B%258A%2589%2588%2587%2586%2585%2584%2583%2582%2581%2580%257F%257E%257D%257C%257B%257A%2579%2578%2577%2576%2575%2574%2573%2572%2571%2570%256F%256E%256D%256C%256B%256A%2569%2568%2567%2566%2565%2564%2563%2562%2561%2560%255F%255E%255D%255C%255B%255A%2559%2558%2557%2556%2555%2554%2553%2552%2551%2550%254F%254E%254D%254C%254B%254A%2549%2548%2547%2546%2545%2544%2543%2542%2541%2540%253F%253E%253D%253C%253B%253A%2539%2538%2537%2536%2535%2534%2533%2532%2531%2530%252F%252E%252D%252C%252B%252A%2529%2528%2527%2526%2525%2524%2523%2522%2521%2520%251F%251E%251D%251C%251B%251A%2519%2518%2517%2516%2515%2514%2513%2512%2511%2510%250F%250E%250D%250C%250B%250A%2509%2508%2507%2506%2505%2504%2503%2502%2501%2500%2026%2025%2024%2023%2022%2021%2020%201F%201E%201D%201C%201B%201A%2019%2018%2017%2016%2015%2014%2013%2012%2011%2010%200F%200E%200D%200C%200B%200A%2009%2008%2007%2006%2005%2004%2003%2002%2001%2000%09%08%07%06%05%04%03%02%01%00%5B%5C%5D%5E%5F%60%61%62%63%64%65%66%67%68%69%6A%6B%6C%6D%6E%6F%70%71%72%73%74%75%76%77%78%79%7A%7B%7C%7D%7E%80%81%82%83%84%85%86%87%88%89%8A%8B%8C%8D%8E%8F%90%91%92%93%94%95%96%97%98%99%9A%9B%9C%9D%9E%9F%A0%A1%A2%A3%A4%A5%A6%A7%A8%A9%2597%2596%2595%2594%2593%2592%2591%2590%258F%258E%258D%258C%258B%258A%2589%2588%2587%2586%2585%2584%2583%2582%2581%2580%257F%257E%257D%257C%257B%257A%2579%2578%2577%2576%2575%2574%2573%2572%2571%25

link: <https://m.blog.naver.com/PostView.nhn?blogId=winzone&logNo=220531162710&proxyReferer=https%3A%2F%2Fwww.google.com%2F>

## 가이거계수기

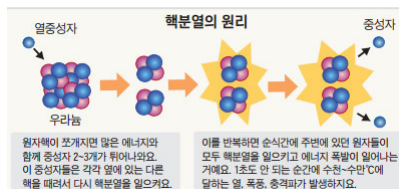
- 이온화 방사선을 측정하는 장치
- 알파 입자, 베타 입자, 감마선과 같은 방사능에 의해 불활성 기체가 이온화되는 정도를 표시하여 방사능을 측정



(source: [https://upload.wikimedia.org/wikipedia/commons/thumb/4/44/Geiger\\_Mueller\\_Counter\\_with\\_Circuit-en.svg/1280px-Geiger\\_Mueller\\_Counter\\_with\\_Circuit-en.svg.png](https://upload.wikimedia.org/wikipedia/commons/thumb/4/44/Geiger_Mueller_Counter_with_Circuit-en.svg/1280px-Geiger_Mueller_Counter_with_Circuit-en.svg.png))

## 핵에너지

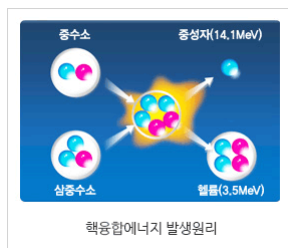
### • 핵분열 에너지



(source: <https://t1.daumcdn.net/cfile/tistory/996E373A5A5BC97C16>)

### • 핵융합 에너지

- 1억도 이상의 초고온 플라즈마 상태인 별들의 중심에서 수소와 같은 가벼운 원자핵들이 융합해 무거운 헬륨 원자핵으로 바뀌는 핵융합반응이 일어나면서 거대한 에너지가 만들어진다.



(source: <https://www.iterkorea.org/images/korean/sub/con02-06-01-1.gif>)

## 핵무기

- 원자폭탄, 수소폭탄



(source: [https://img.seoul.co.kr/img/upload/2016/09/09/SSI\\_20160909231117.jpg](https://img.seoul.co.kr/img/upload/2016/09/09/SSI_20160909231117.jpg))

link: [http://res.heraldm.com/content/image/2016/01/06/20160106001264\\_0.jpg](http://res.heraldm.com/content/image/2016/01/06/20160106001264_0.jpg)

## ● 핵물리학에 대한 토론

### ● 주제 1. 방사능 붕괴

Youtube: 방사능 붕괴

### ● 주제 2. 중성미자란?

Youtube: 중성미자

Youtube: 중성미자와 우주 생성 비밀

### ● 주제 3. 핵에너지의 명과 암

Youtube: 핵에너지의 명암

## ● 핵물리학의 이해 및 개념 확인 퀴즈 6개 (Kahoot quiz)

- PC: kahoot.com 또는 kahoot.it (즉석 퀴즈 참여)
- Mobile: kahoot app 설치 또는 kahoot.it (즉석 퀴즈 참여)

## Prestudy: wk12

### 양자물리학 (Quantum Physics)

광전효과 / 파동-입자 이중성 / 드브로이의 가설 / (전자현미경) / 슈뢰딩거 파동방정식 / 양자 터널효과 / 코펜하겐 해석 / 양자역학과 불확정성원리 / 슈뢰딩거의 고양이 / (그 외의 양자 해석) / (양자수) / (스핀) / (보스입자와 페르미입자, 그리고 파울리의배타원리) / 자기공명 영상 / (축퇴) / (양자 얽힘) / 양자 계산과 암호 / (초유동체)

## keywords

- 파동-입자 이중성
- 양자역학과 불확정성원리
- 양자 계산과 암호

## ● 양자물리학에 대한 토론

### ● 주제 1. 파동-입자 이중성

Youtube: 파동-입자 이중성

### ● 주제 2. 양자역학과 불확정성원리?

Youtube: 불확정성원리

### ● 주제 3. 양자 계산과 암호

Youtube: 양자 계산과 암호

## ● 양자물리학의 이해 및 개념 확인 퀴즈 6개 (Kahoot quiz)

- PC: kahoot.com 또는 kahoot.it (즉석 퀴즈 참여)

- Mobile: kahoot app 설치 또는 kahoot.it (즉석 퀴즈 참여)

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수업자료실 : **github**

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> **Redwood's GitHub**

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<https://github.com/redwoods/physics>

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