

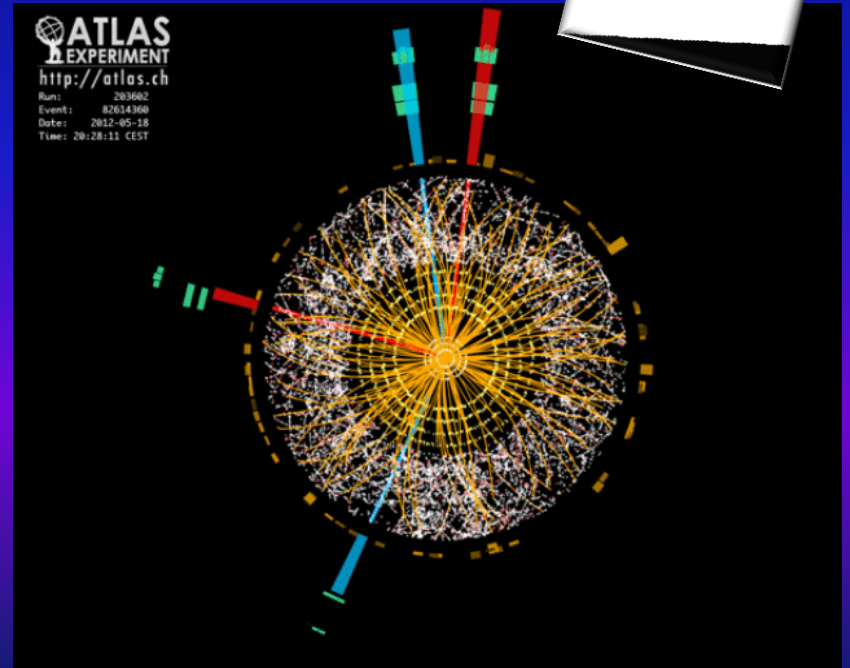
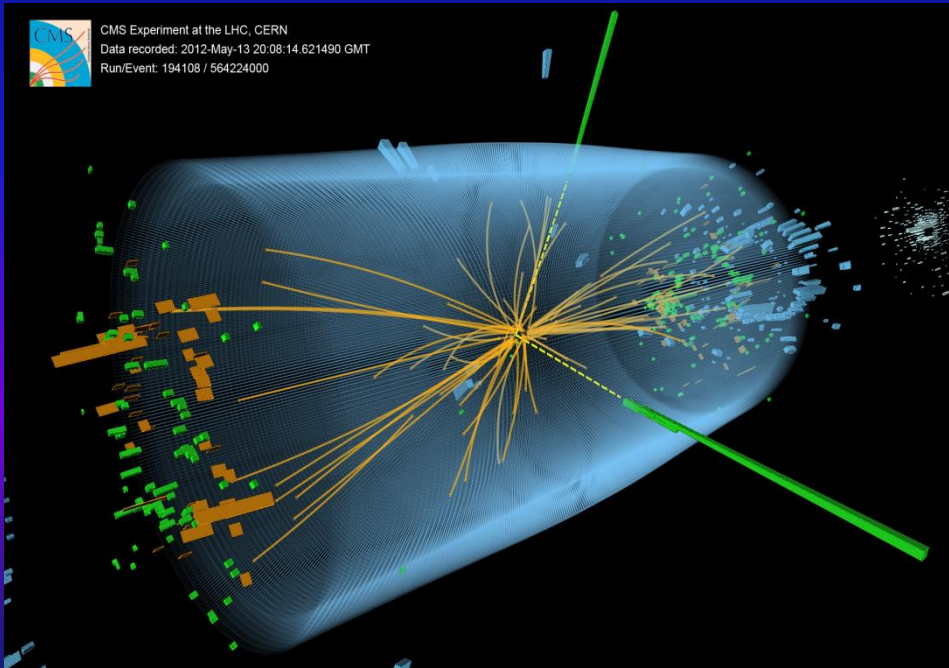
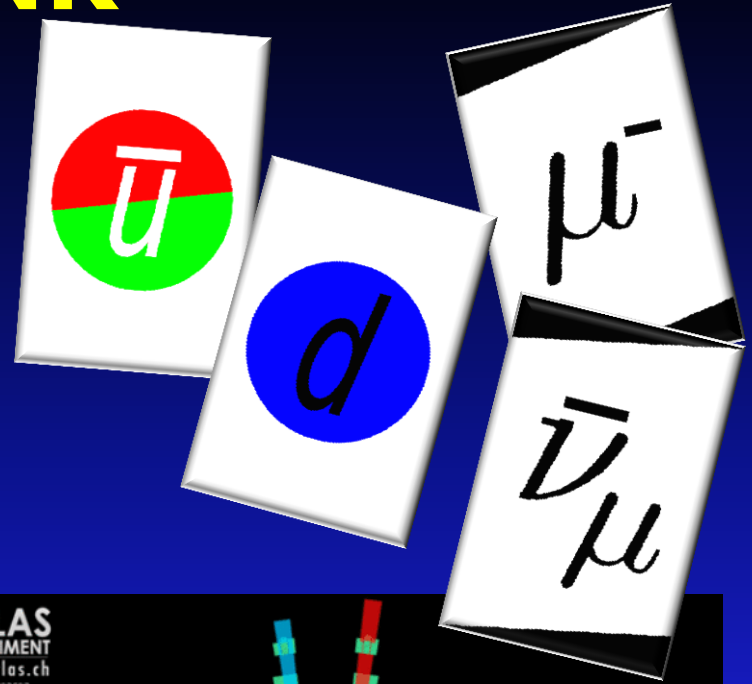
HOGYAN CSINÁLJUNK HÁZILAG HIGGS BOSONT ?

Csörgő Tamás

Csorgo.Tamas @ wigner.mta.hu

arXiv:1303.2732 [physics.pop-ph]

www.reszecskes.hu



ELEMI RÉSZECSKÉK - JÁTÉKOSAN

Three generations of matter (fermions)

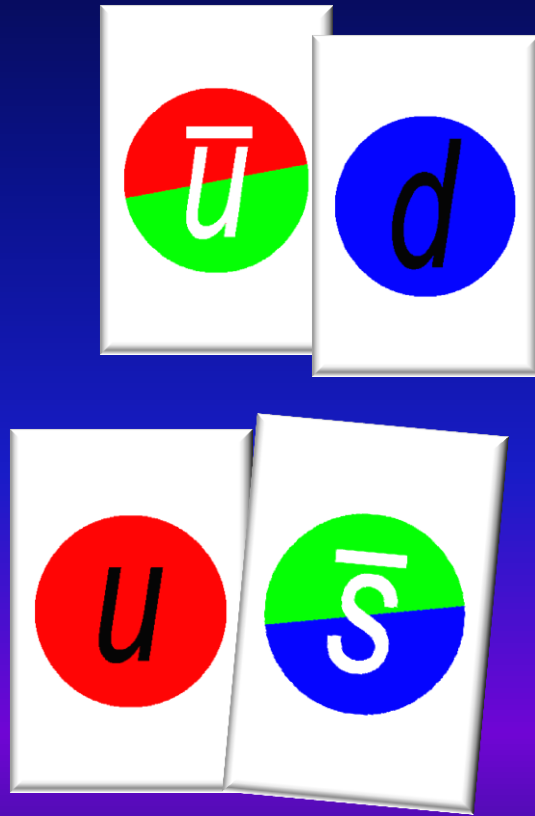
	I	II	III		
mass →		1.27 GeV/c ²	171.2 GeV/c ²	0	? GeV/c ²
charge →		$\frac{2}{3}$	$\frac{2}{3}$	0	0
spin →		$\frac{1}{2}$	$\frac{1}{2}$	1	0
name →	u	c charm	t top	γ photon	H Higgs boson
Quarks	d	s	b bottom	g gluon	
	ν_e	ν_μ	ν_τ tau neutrino	Z⁰ Z boson	
Leptons	e⁻	μ⁻	τ tau	W[±] W boson	

Gauge bosons

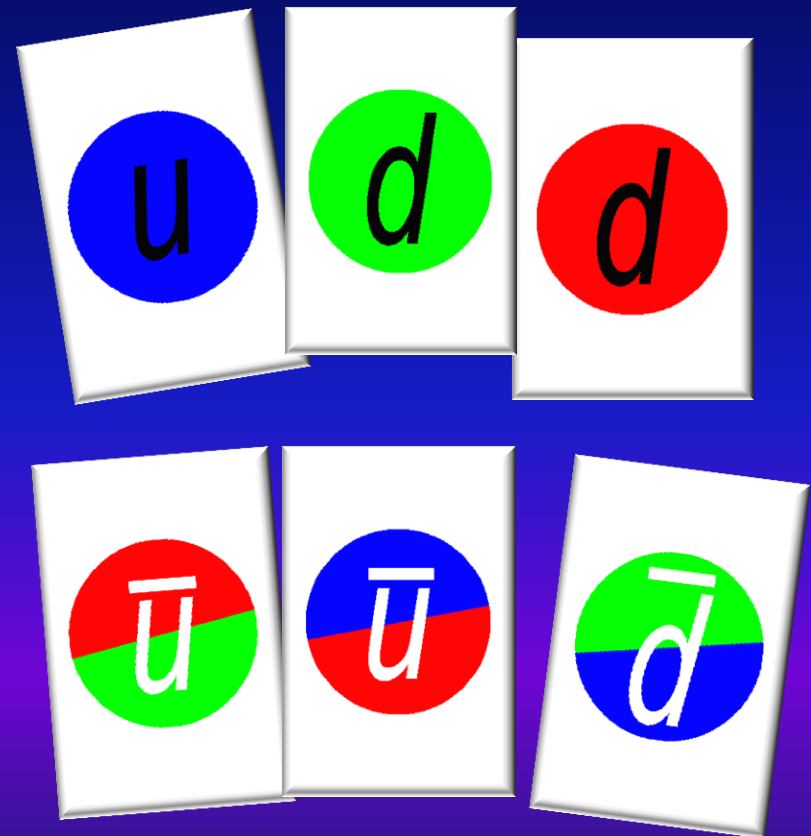


SU(3) SZÍN ÉS OPTIKAI SZÍN

Mezonok



Barionok



DIÁK ÖTLET: RÉSZECSKÉS KÁRTYA

Ma már:

INNOVÁCIÓ, szabadalom, TERMÉK

66 kártya, az első 4 játék:

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- Kvaranyag (BNL)
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NEMZETKÖZI SAJTÓBAN, BNL

SUBATOMIC SHUFFLE

Prefer particle physics to poker? Pick up a deck of the Quark Matter Cards. Instead of kings and queens, the cards feature quarks (up, down, top, and bottom), leptons (electrons, muons, and taus), and their neutrinos; and antiparticles for all.

Hungarian high school students Csaba Török and Judit Csörgő and their father, Tamás, a physicist at the KFKI Research Institute for Particle Physics and Astrophysics in Budapest. The simplest game is "Anti," in which players quickly identify combinations, bearing in mind a quantum-mechanical property called the color of the card. It's an abstract concept, but "even children who can't read can play," Tamás says. For adult players, he recommends "Quark Matter," which is based on the quark-gluon plasmas physicists cook up at Brookhaven National Laboratory's Relativistic Heavy Ion Collider (RHIC).

Relativistic Heavy Ion Collider (RHIC) PHENIX experiment cards



2011.01.04.

Quark Matter at RHIC: It's in the Cards

@brookhavenToday Story Archives

Quark Matter at RHIC: It's in the Cards

Students and RHIC physicist develop quark-gluon plasma card game

By Karen McNulty Walsh | January 4, 2011

Happy New Year! Like the sprays of confetti and streamers exploding in Times Square at midnight on December 31, millions of subatomic particles will soon be streaming from heavy ion collisions at RHIC, Brookhaven National Laboratory's Relativistic Heavy Ion Collider.

Linking subatomic particles with New Year's Eve celebrations may not be so strange: Two years ago, a group of Hungarian secondary school students rang in the New Year while playing with particles, literally. The group, which included Judit Csörgő, daughter of RHIC/PHENIX collaborator Tamás Csörgő, and her friend Csaba Török, were at a New Year's celebration, playing with the first edition of a set of cards invented by Csaba as an entertaining way to learn about subatomic particles and their interactions. The game, more formally developed and tested by the students with mentoring help from Tamás, won an honorable mention in a 2010 Hungarian competition for junior innovators. It is now available for purchase as an e-book, with cards included, on Lulu, currently with Hungarian directions. An English version is in the works.



RHIC/PHENIX collaborator Tamás Csörgő, Csaba Török and Judit Csörgő with their card game at the exhibition in the "Palace of Wonders" after the ceremony of the 19th Hungarian National Contest for Junior Innovators and Scientist (Budapest, Hungary, June 10, 2010).

CERN, DÍJAK, TESZTEK

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PLAYING WITH PARTICLES

Could the principles of particle physics ever be explained by a game? Could we ever teach the Standard Model the way Monopoly teaches economics? And, using the Quark Matter card game, the answer is an easy "yes!".



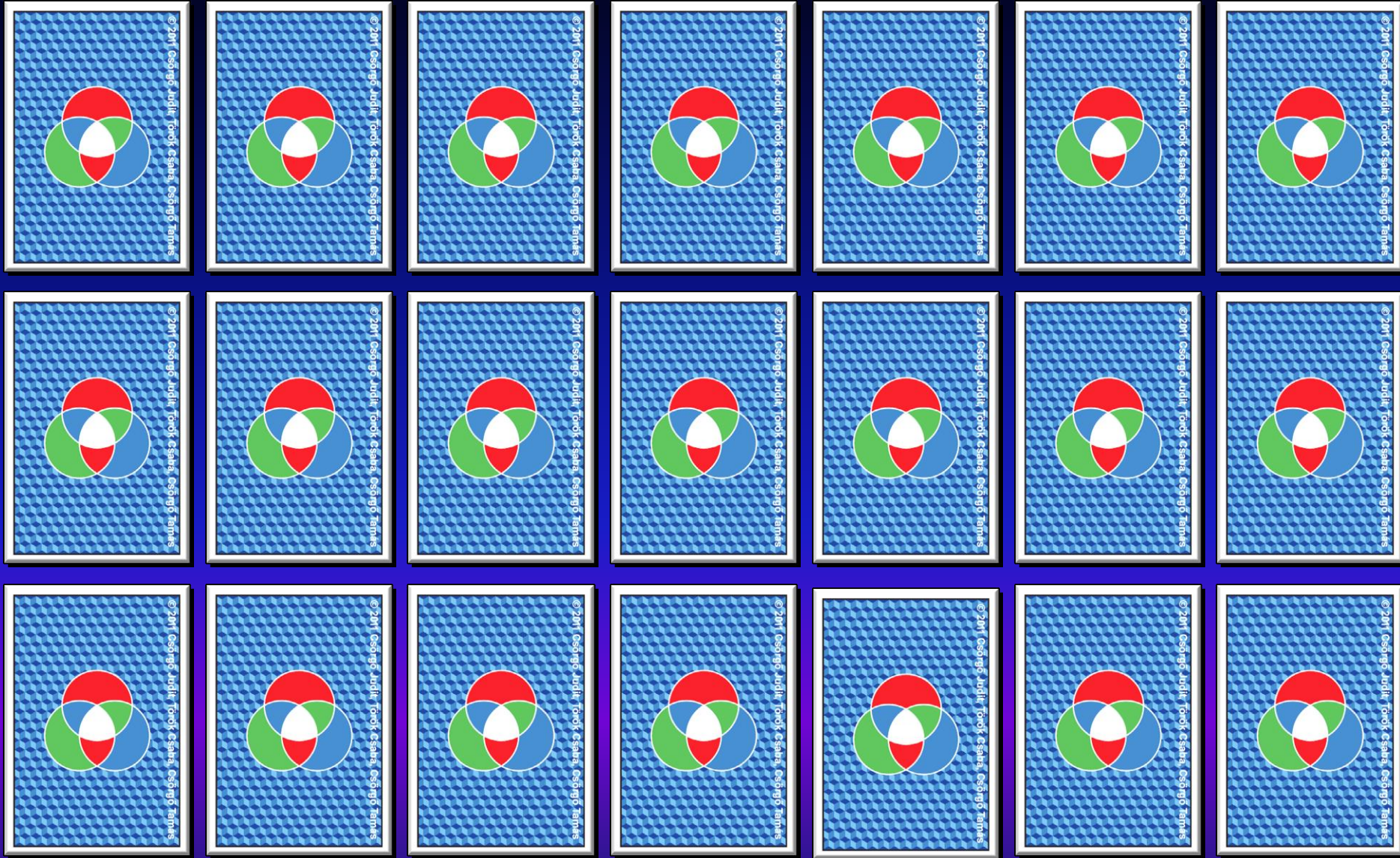
Csaba Török and Judit Csörgő (second and third from left) at the award ceremony for the Eötvös University Innovation Contest.

Hungary, and they are now both studying science at the ELTE University, Budapest.

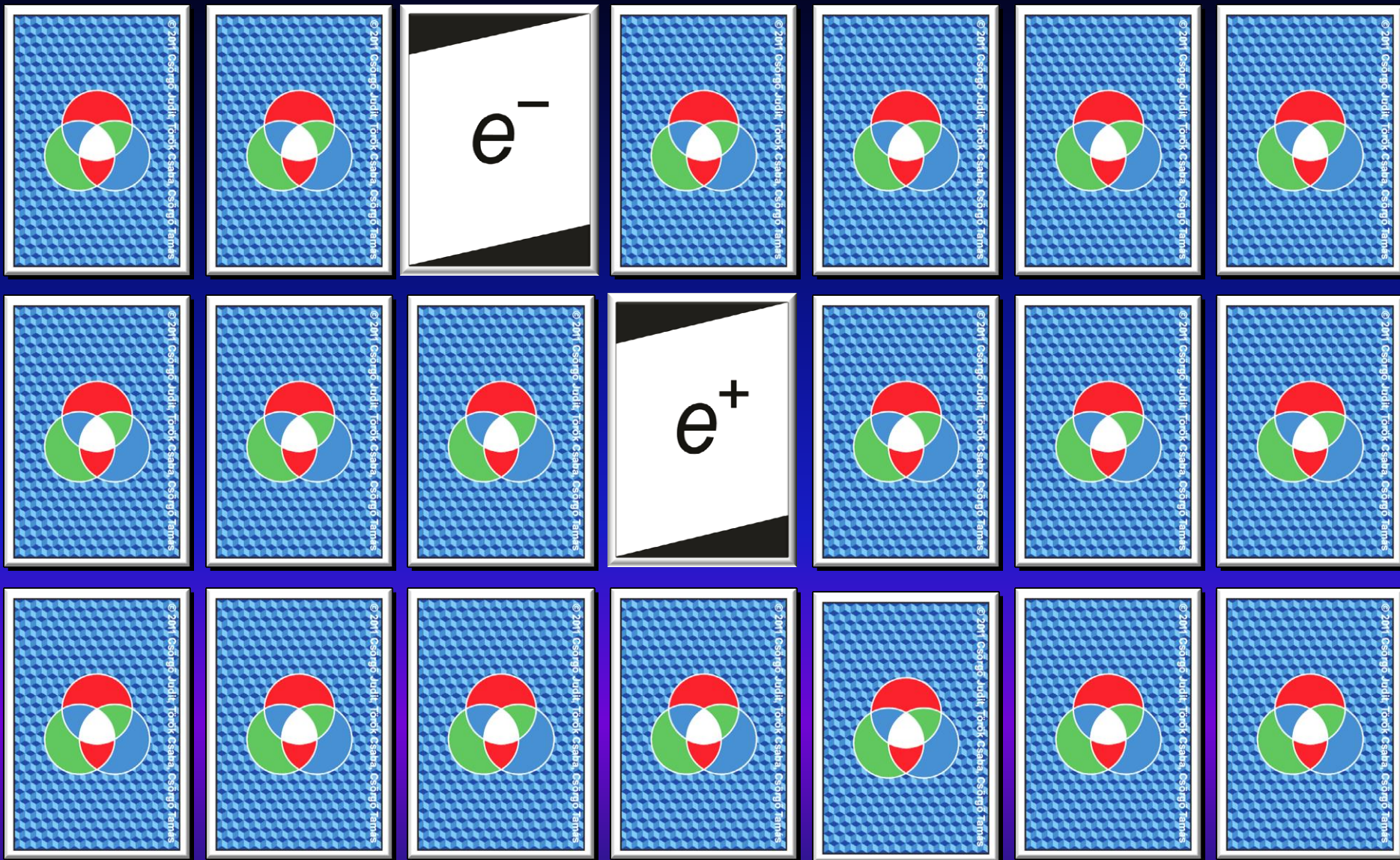
When he was only 17 years old, Hungarian student Csaba Török came up with the idea for the Quark Matter cards. "I wanted people to think of the Standard Model as fun – not just a serious, scientific theory," says Csaba. "The cards can turn everyone into a pseudo-physicist." He shared the idea with his friend Judit Csörgő and her physicist father, Tamás Csörgő, and together they went on to develop Quark Matter into the game it is today. Csaba and Judit were both members of the Science Club that Tamás re-organized and mentors at the Berze Secondary School in Gyöngyös, Hungary, and they are now both studying science at the ELTE University, Budapest.



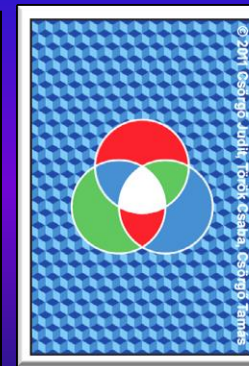
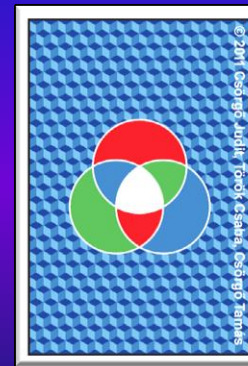
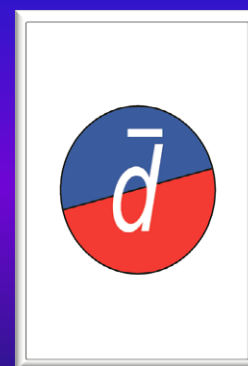
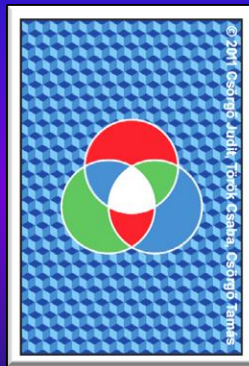
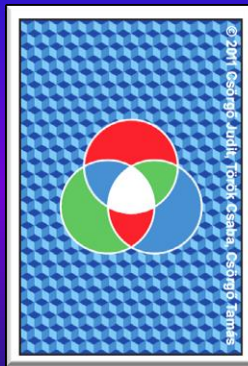
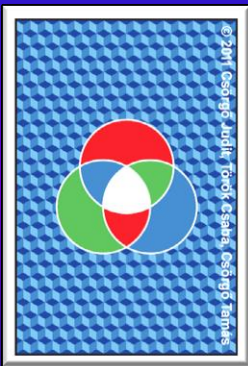
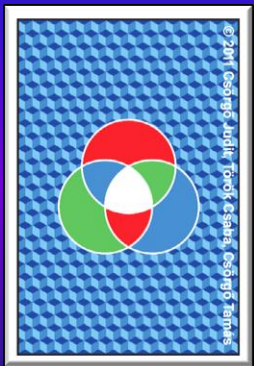
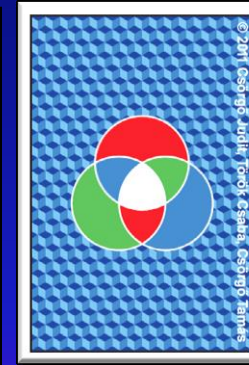
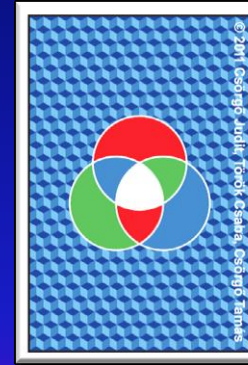
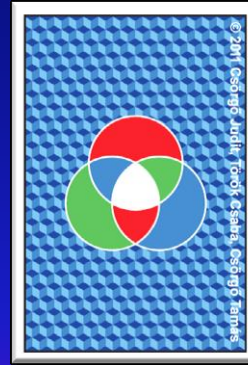
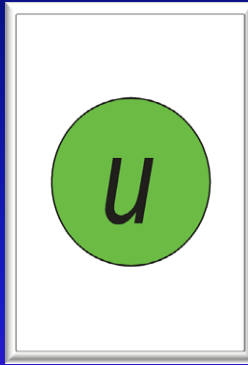
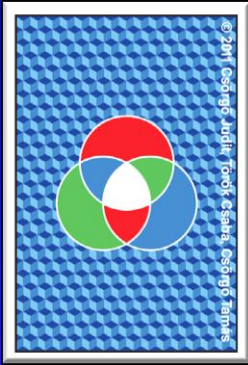
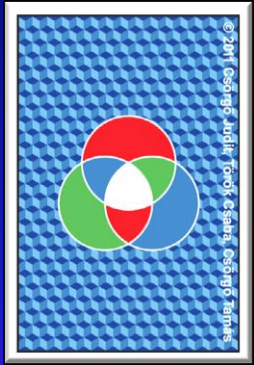
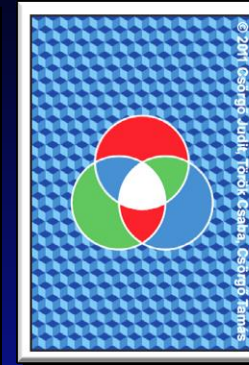
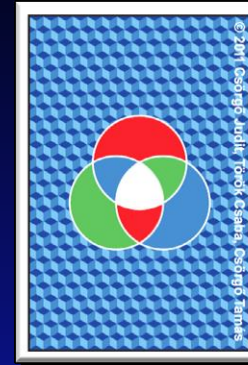
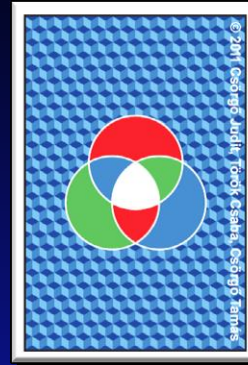
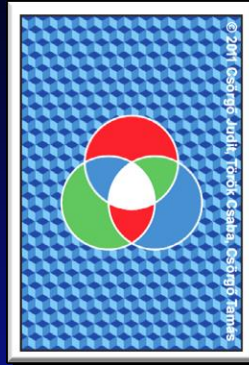
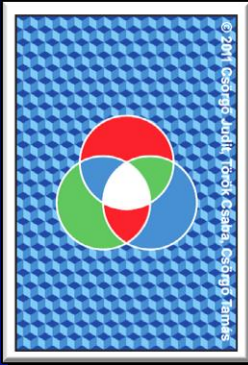
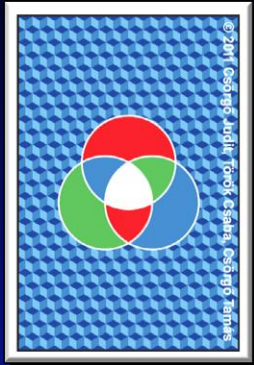
HOL A HIGGS? - MEMÓRIA JÁTÉK



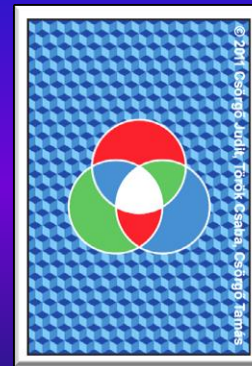
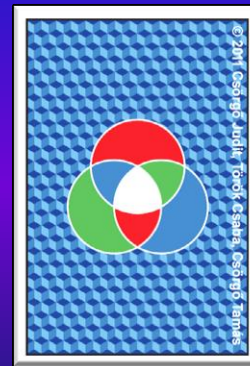
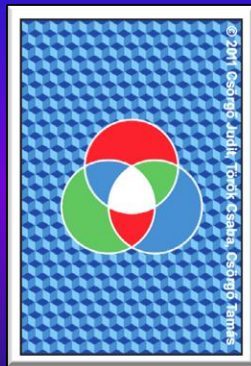
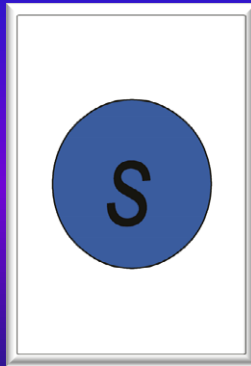
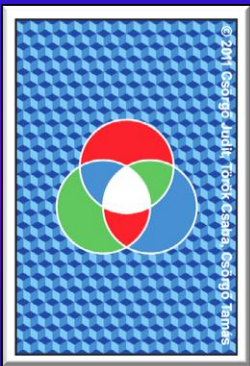
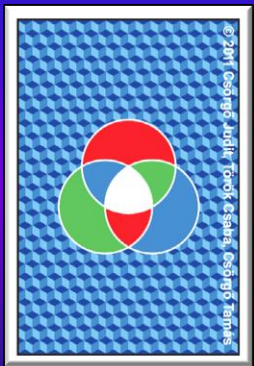
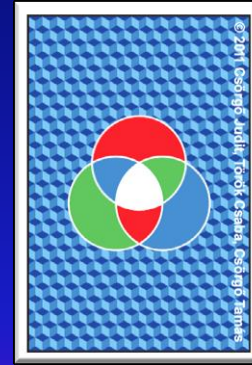
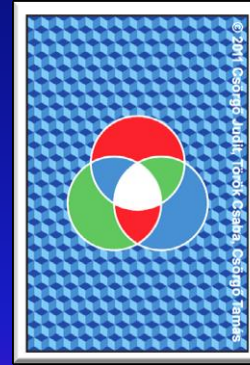
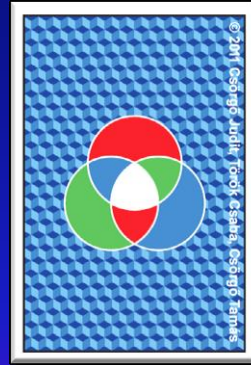
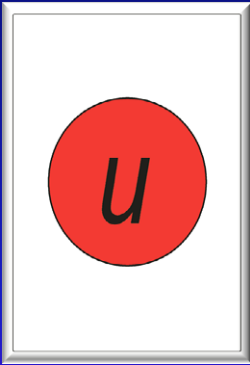
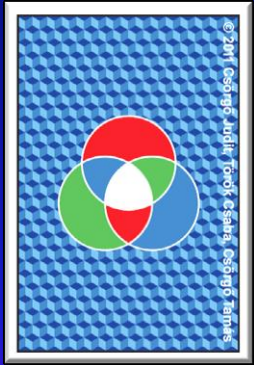
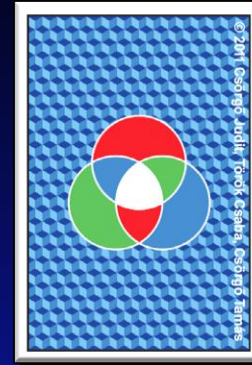
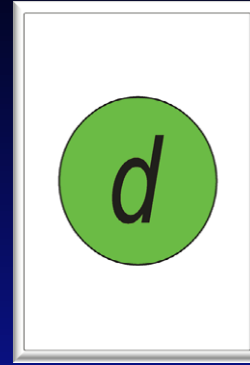
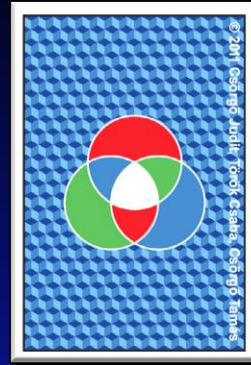
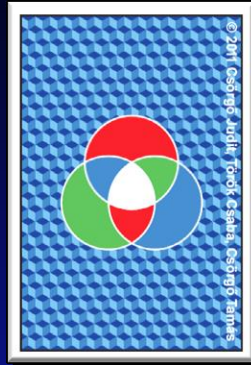
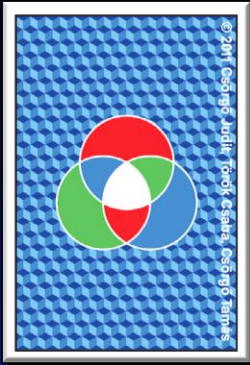
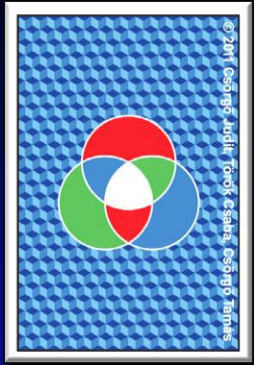
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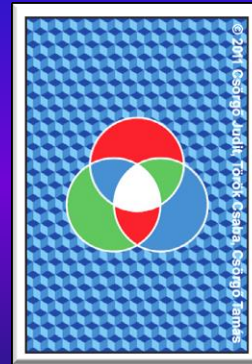
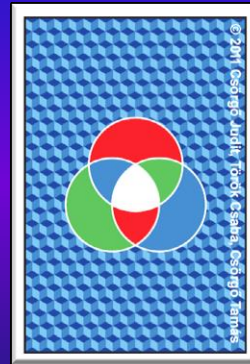
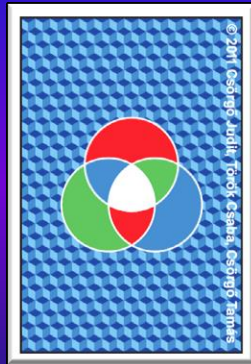
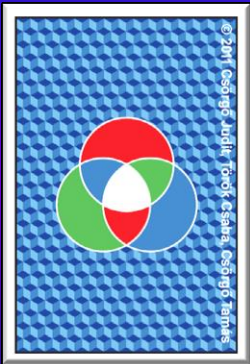
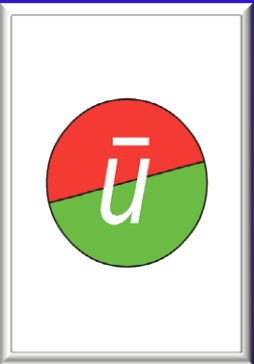
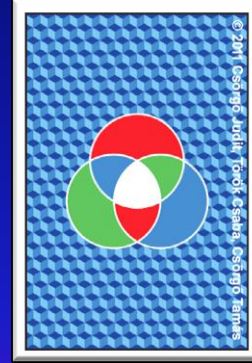
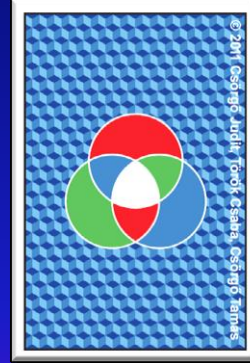
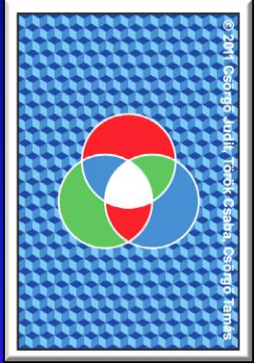
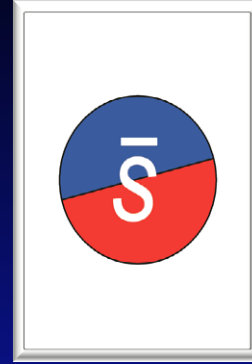
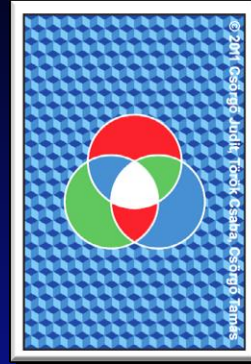
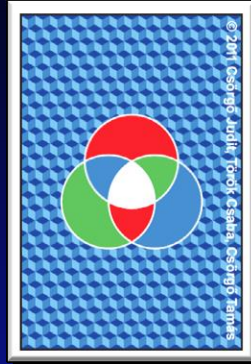
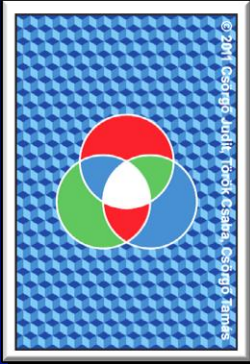
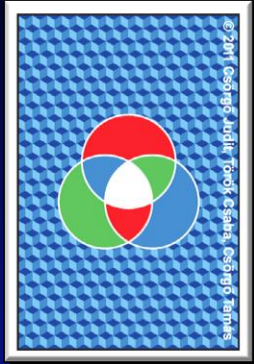
TALÁLJUNK MEZONT



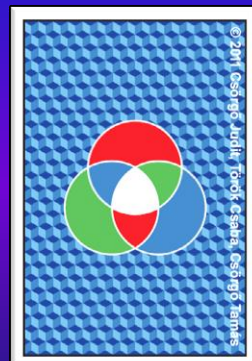
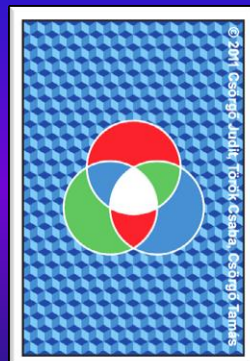
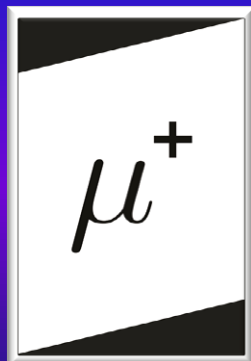
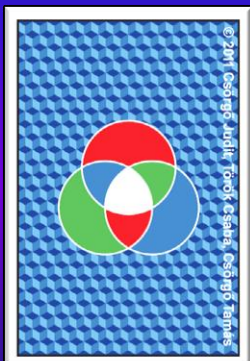
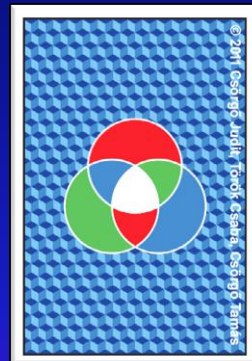
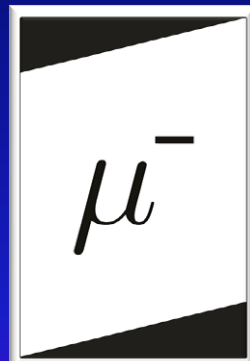
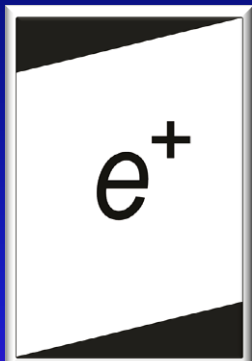
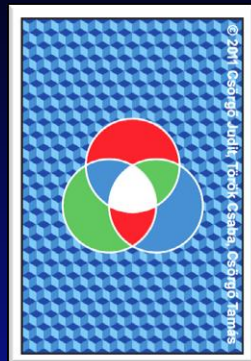
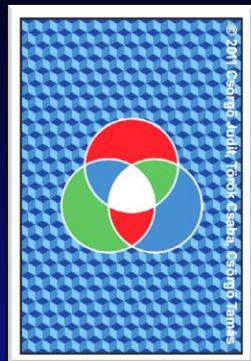
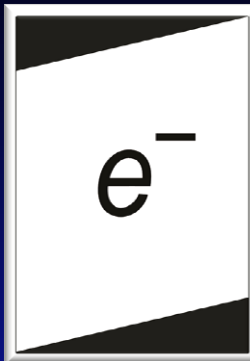
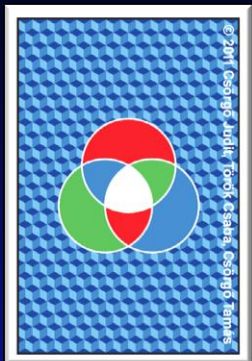
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TALÁLJUNK ANTI-BARIONT ...



... HIGGS BOZONT: $H^0 \rightarrow Z^0 Z^0 \rightarrow \ell^+ \ell^- \ell^+ \ell^-$

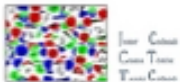


3. ANGOL KIADÁS, BNL BOLT

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QUARK MATTER CARD GAME



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Quark Matter Card Game

By Judit Csörgő, Csaba Török,
Tamás Csörgő

Paperback: List Price: \$27.04

\$19.56 You Save: 30%

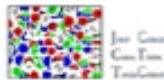
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QUARK MATTER CARD GAME



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Quark Matter Card Game

By Judit Csörgő,
Tamás Csörgő

eBook (PDF): \$

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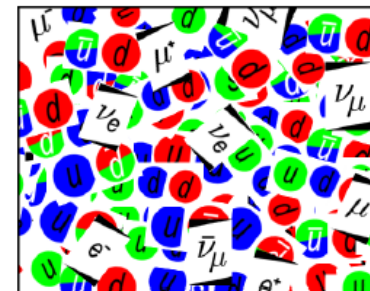
New card game for kids with gleaming eyes - as well as for their relatives, laypersons, teachers, scholars and researchers, 5-99 years of age: for anyone, who is interested in a playful and hands-on... [More >](#)

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QUARK MATTER CARD GAME

ELEMENTARY PARTICLES - ON YOUR OWN

THIRD, REVISED AND EXTENDED ENGLISH EDITION



JUDIT CSÖRGŐ
CSABA TÖRÖK
TAMÁS CSÖRGŐ

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INNOVÁCIÓ, szabadalom, TERMÉK

MA MÁR: 3 SZABAD JÁTÉK A TUDÁSSAL

Higgs-bozont- Házilag!

A Kvarkanyag Memóriája

CERN NYÍLT NAPOK (Sept 27-29,2013):

Póker Kvarkokra és Leptonokra

TERVEK: Fordítás különböző nyelvekre

Kísérlet specifikus játékok:

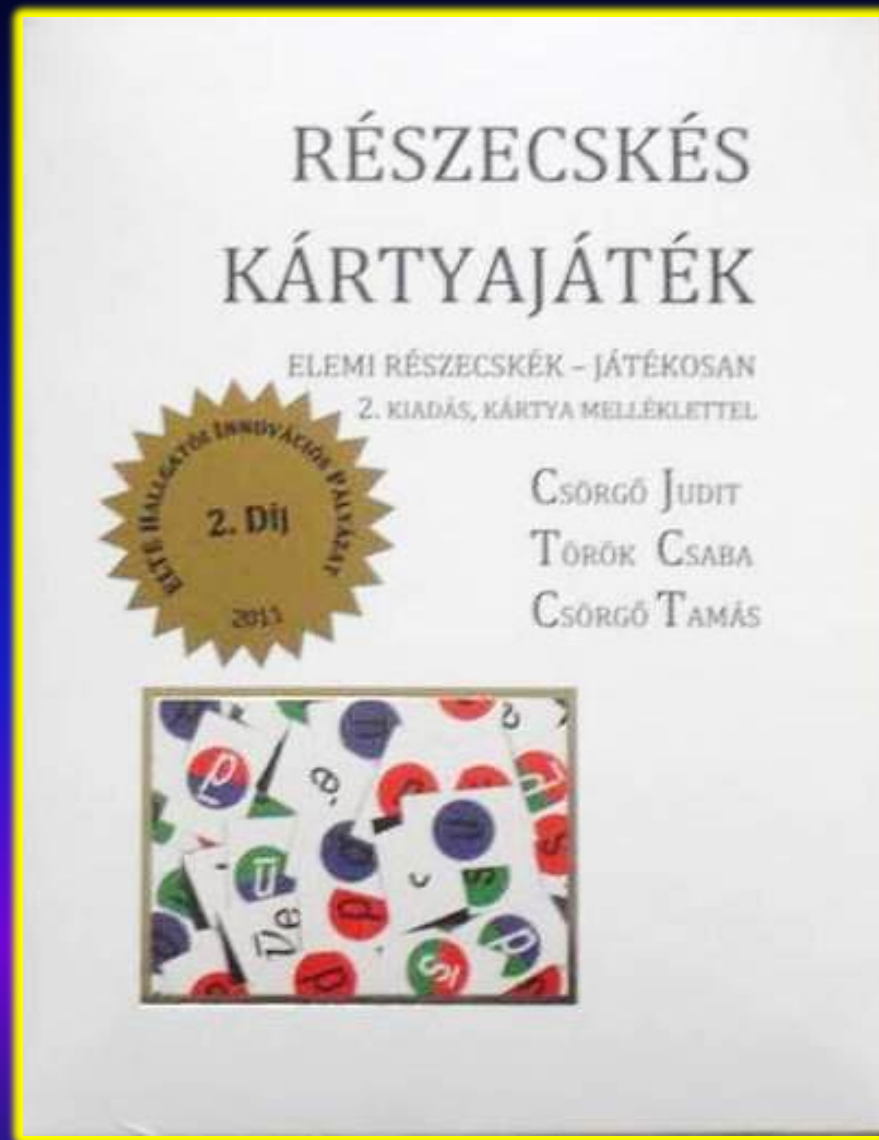
ATLAS, ALICE, CMS, LHCf, LHCb,

MoEDAL, PHENIX, STAR, TOTEM

EZ ITT a segítség helye !

Hogy valóban terjedhessen a tudás ...

Minden segítséget köszönettel fogadunk!



SUMMARY

