HINPw7

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HINPw7
May 31, 2024 ▪ Ioannina, Greece

Opening

Athena Pakou

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Physics

Christos Tsabaris

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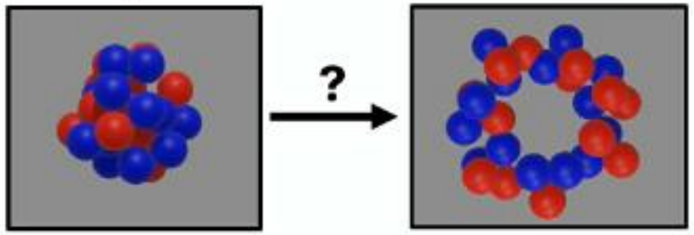
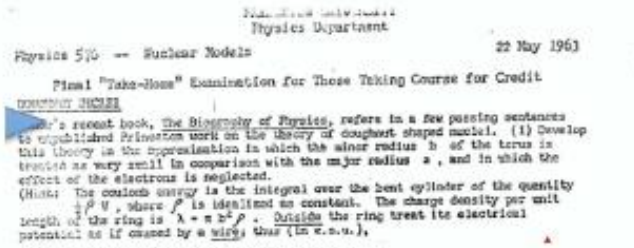
Session 1

Reaction Dynamics (I)

History of Toroidal Nuclei



Wheeler Take-Home Exam (1963)



Physics Department

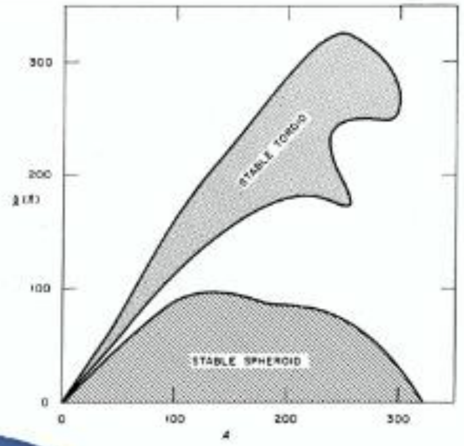
Physics 576 -- Nuclear Models 22 May 1963

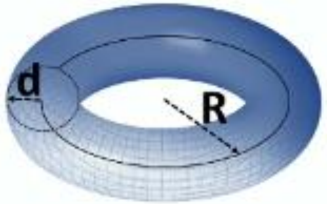
Final "Take-Home" Examination for Those Taking Course for Credit

...r's recent book, The Biography of Physics, refers in a few passing sentences to unpublished Princeton work on the theory of doughnut shaped nuclei. (1) Develop this theory in the approximation in which the minor radius b of the torus is treated as very small in comparison with the major radius a, and in which the effect of the electrons is neglected.
(Hint: The coulomb energy is the integral over the bent cylinder of the quantity ½ρ V, where ρ is idealized as constant. The charge density per unit length of the ring is λ = π b² ρ. Outside the ring treat its electrical potential as if caused by a wire; thus (in e.s.u.),

J.A. Wheeler, Nucleonics Notebook (1950) unpublished
J.A. Wheeler Princeton Graduate Course Physics 576 Take-Home Exam Problem 2, May 22, 1963

C.Y. Wong's early works (1972+)





C.Y. Wong, Phys Lett. B, 41, 446-450 (1972)
C.Y. Wong, Phys. Rev. C, 17, 331-340 (1978)
T. Ichikawa, Phys. Rev. Lett., 109, 232503 (2012)

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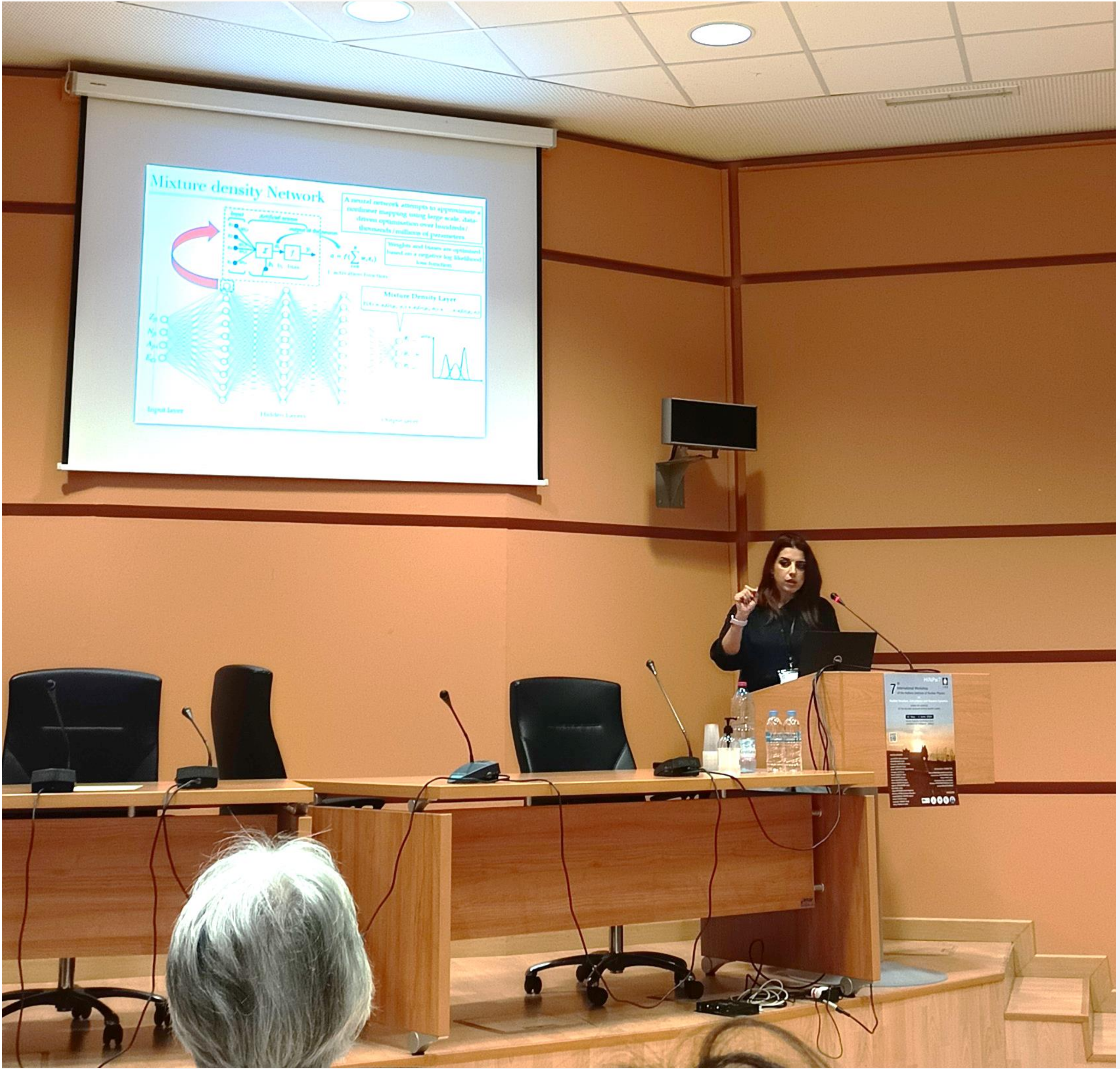

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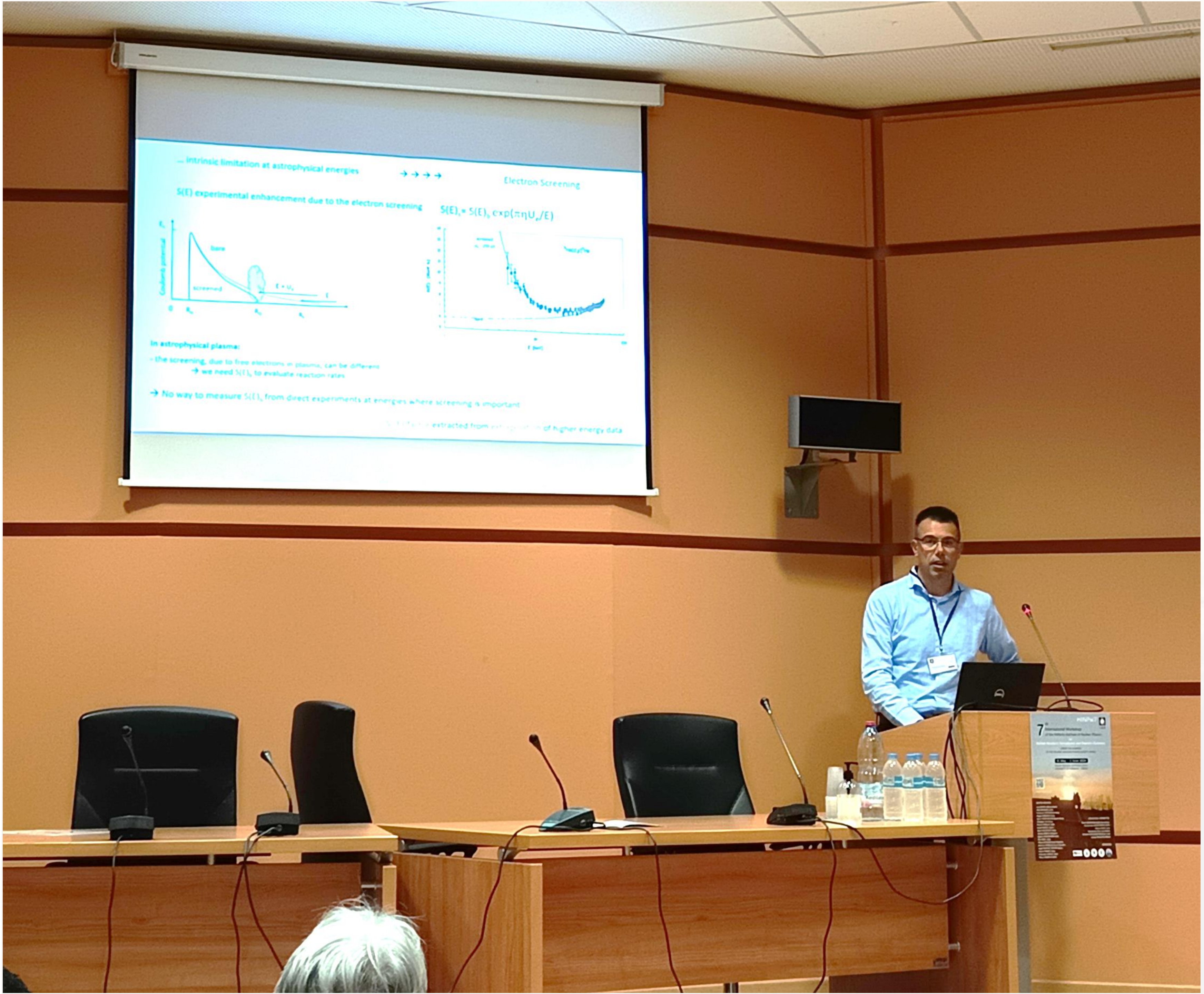
Session 2

Astrophysics



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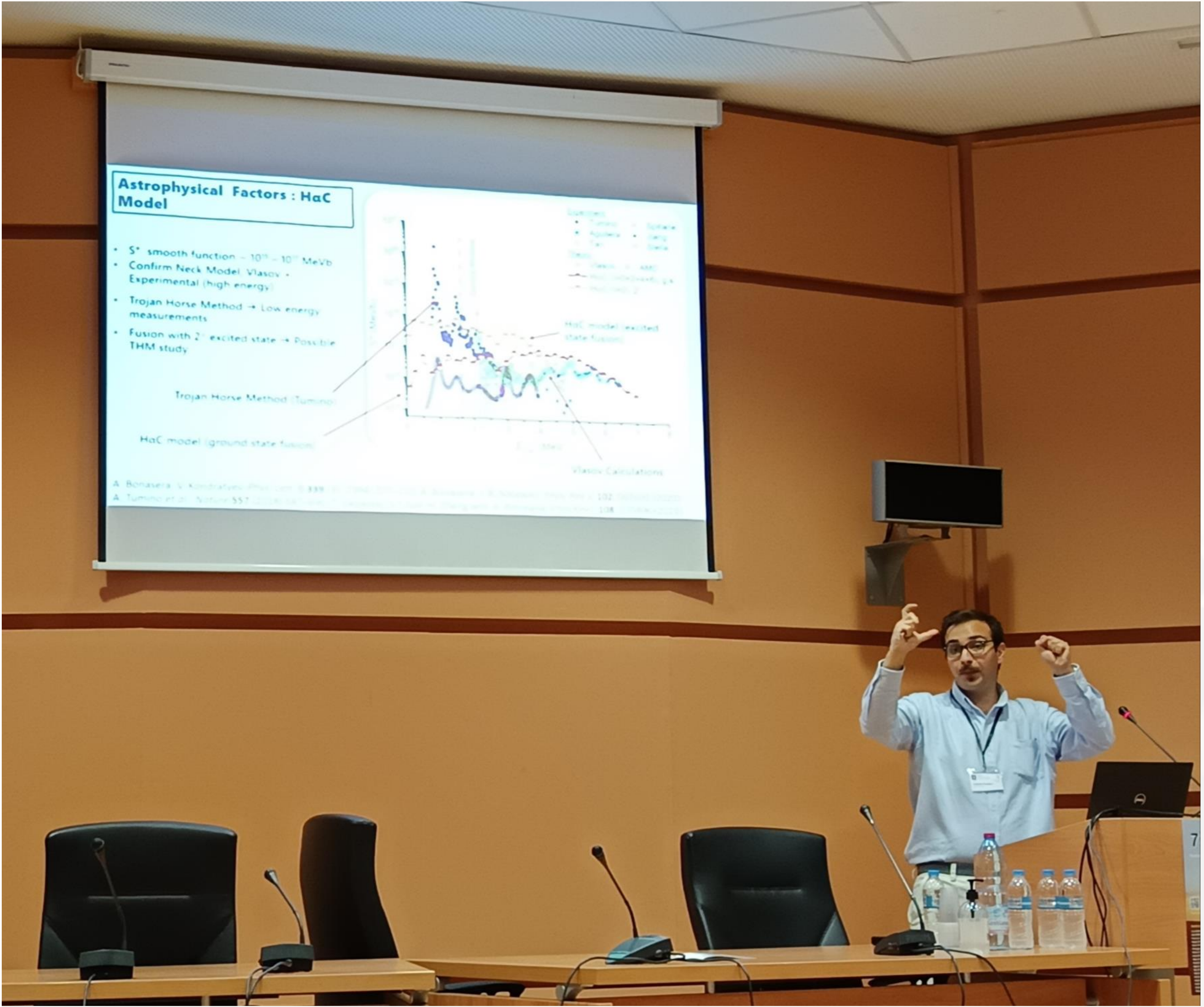

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Session 3

Exotic-Weakly Bound Nuclei

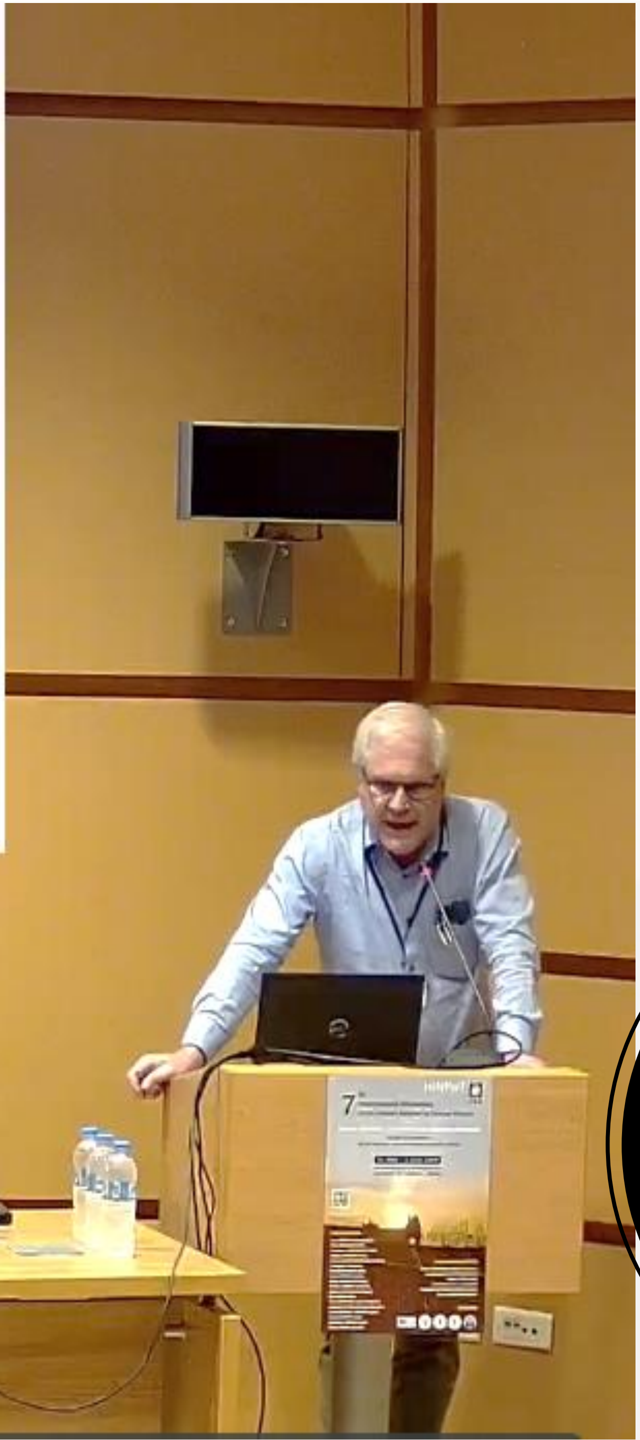
Construction of the optical potential

In coordinate space, the OMP for elastic scattering is

$$U(\mathbf{r},\mathbf{r}';E) = \delta(\mathbf{r}-\mathbf{r}')\sum_i n_i \int \varphi_i^*(\mathbf{s})\, g_D(\mathbf{r},\mathbf{s};E)\, \varphi_i(\mathbf{s})\, d\mathbf{s}$$
$$+ \sum_i n_i \varphi_i^*(\mathbf{r}')\, g_E(\mathbf{r},\mathbf{r}';E)\, \varphi_i(\mathbf{r})$$
$$= U_D(\mathbf{r},E)\,\delta(\mathbf{r}-\mathbf{r}') + U_E(\mathbf{r},\mathbf{r}';E)\,.$$

- First term is the "$g\rho$" (direct) potential.
- Second term is the exchange term.
- All nonlocality stems from the exchange term.
- Structure enters through the single particle wave functions and occupation numbers, n_i.
- For non-zero spin targets, terms with non-zero spin coupling may be included via the DWA.

Structure of the target is critical.



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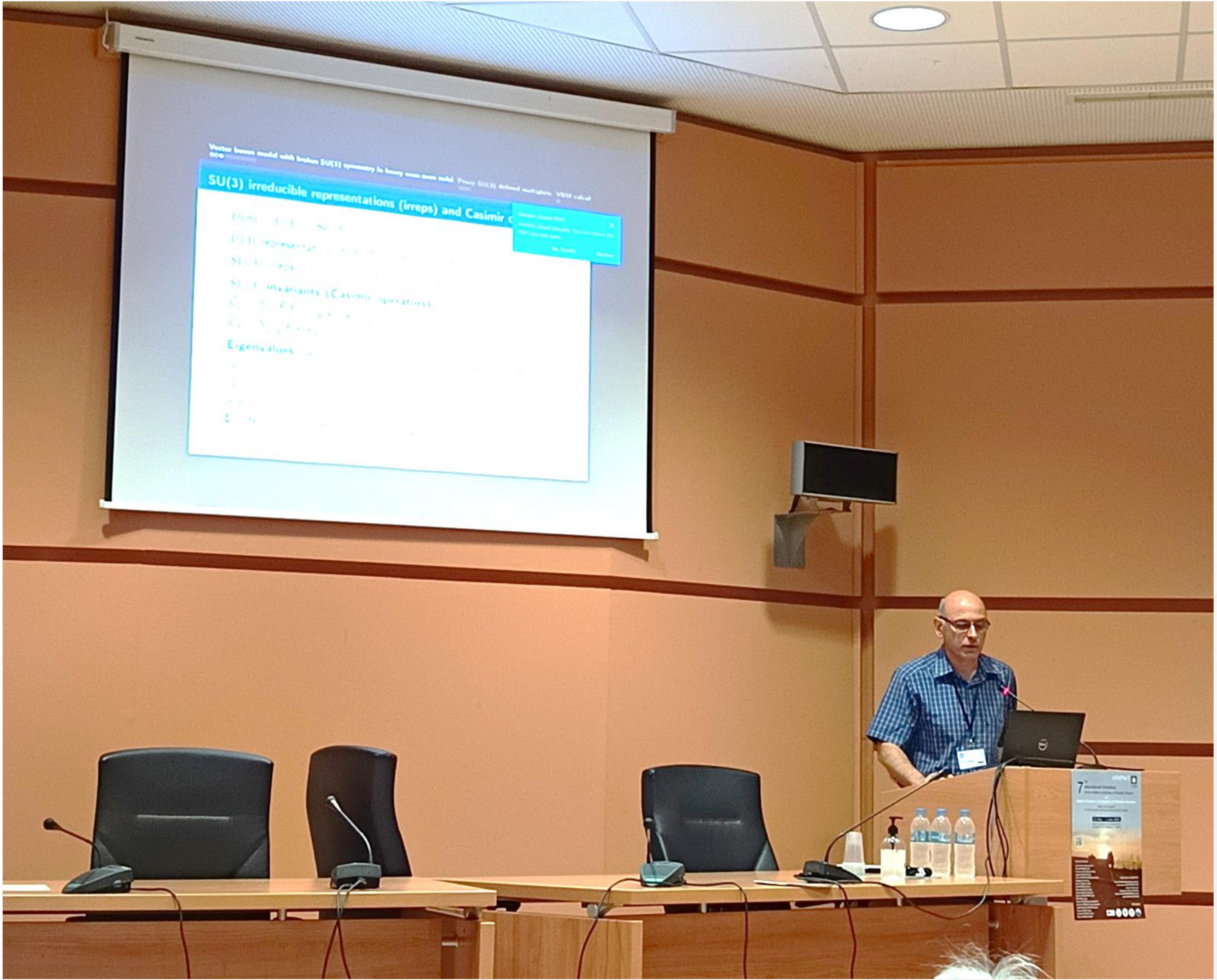
Session 4

Nuclear Structure



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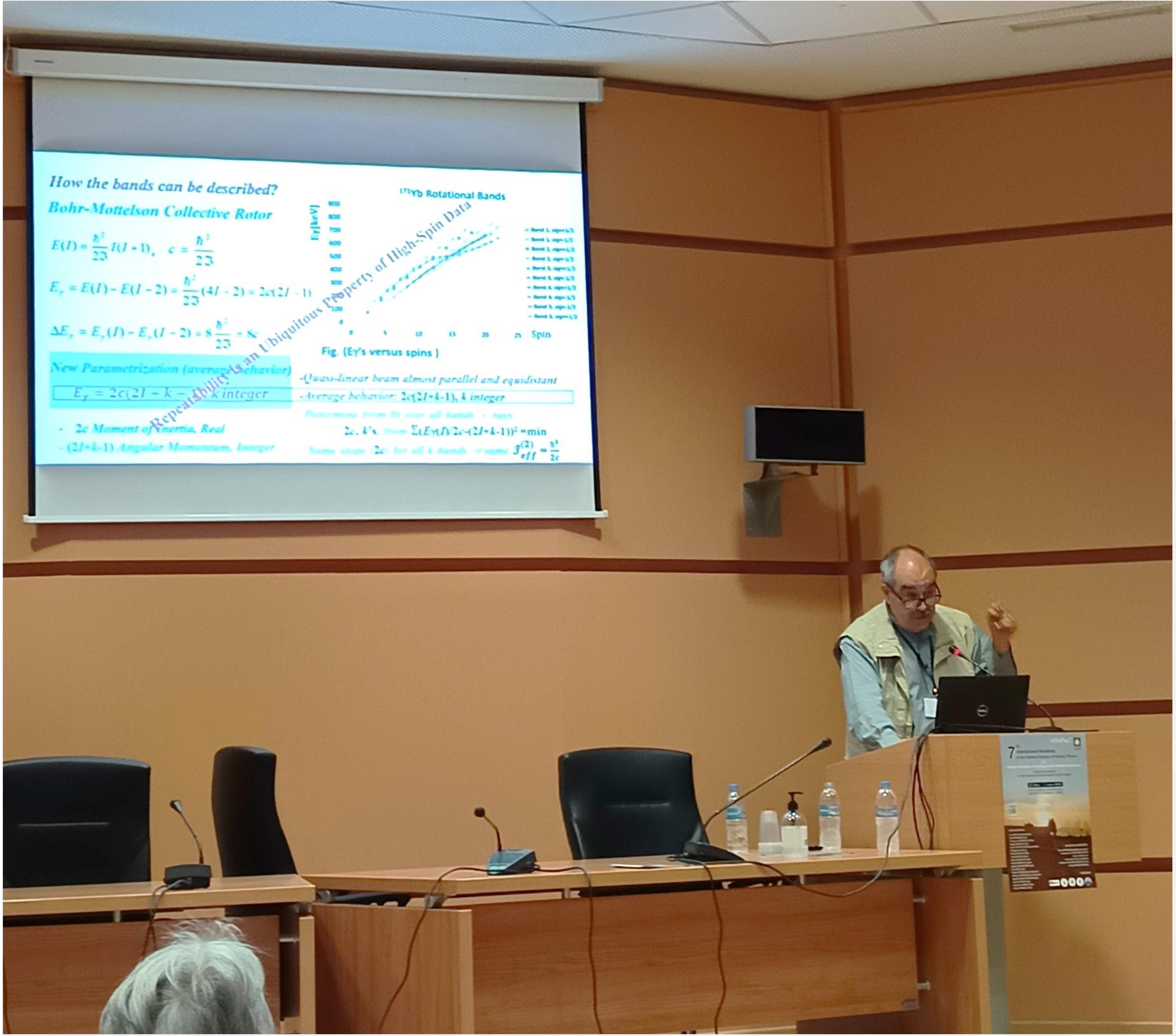

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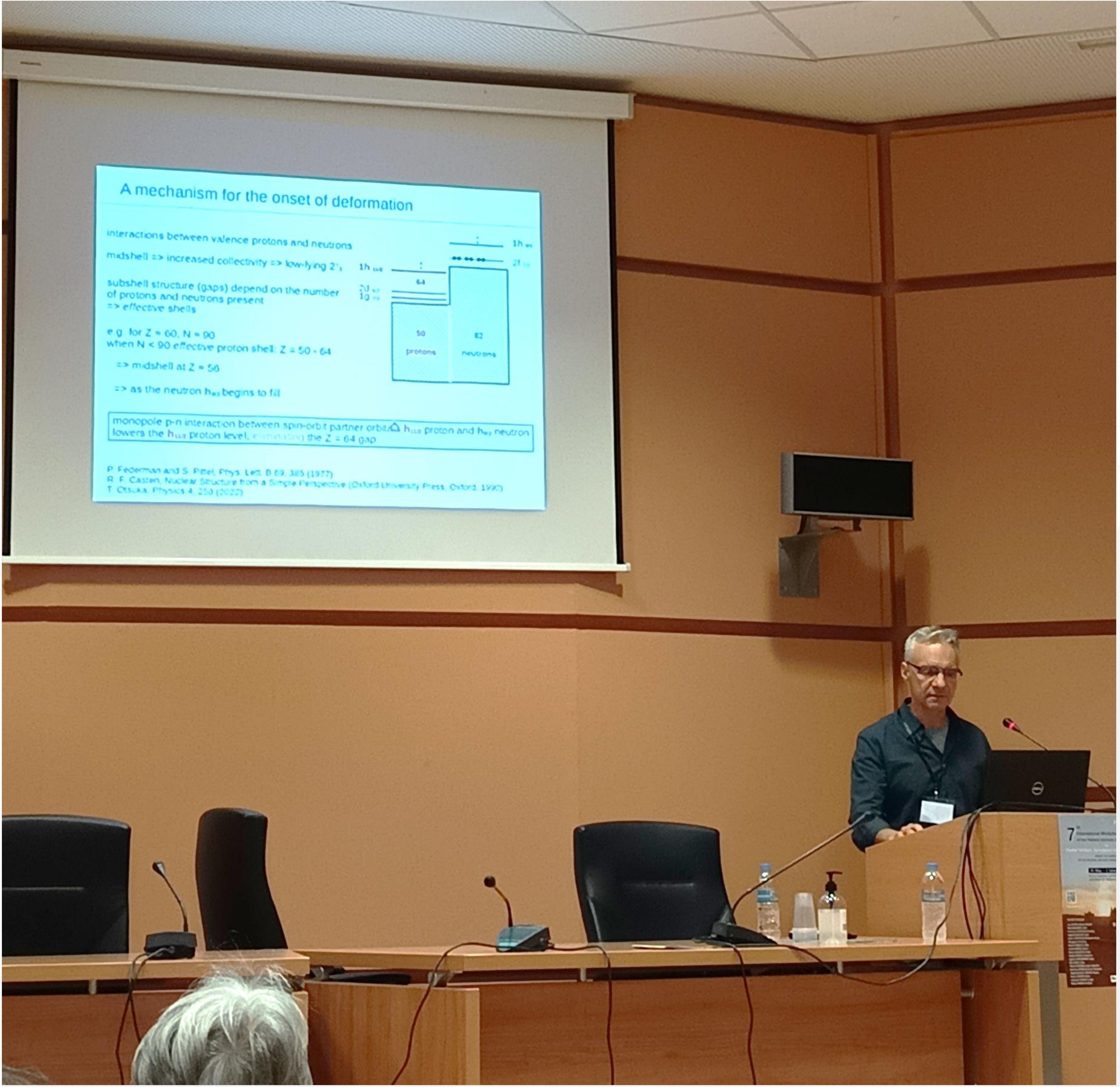

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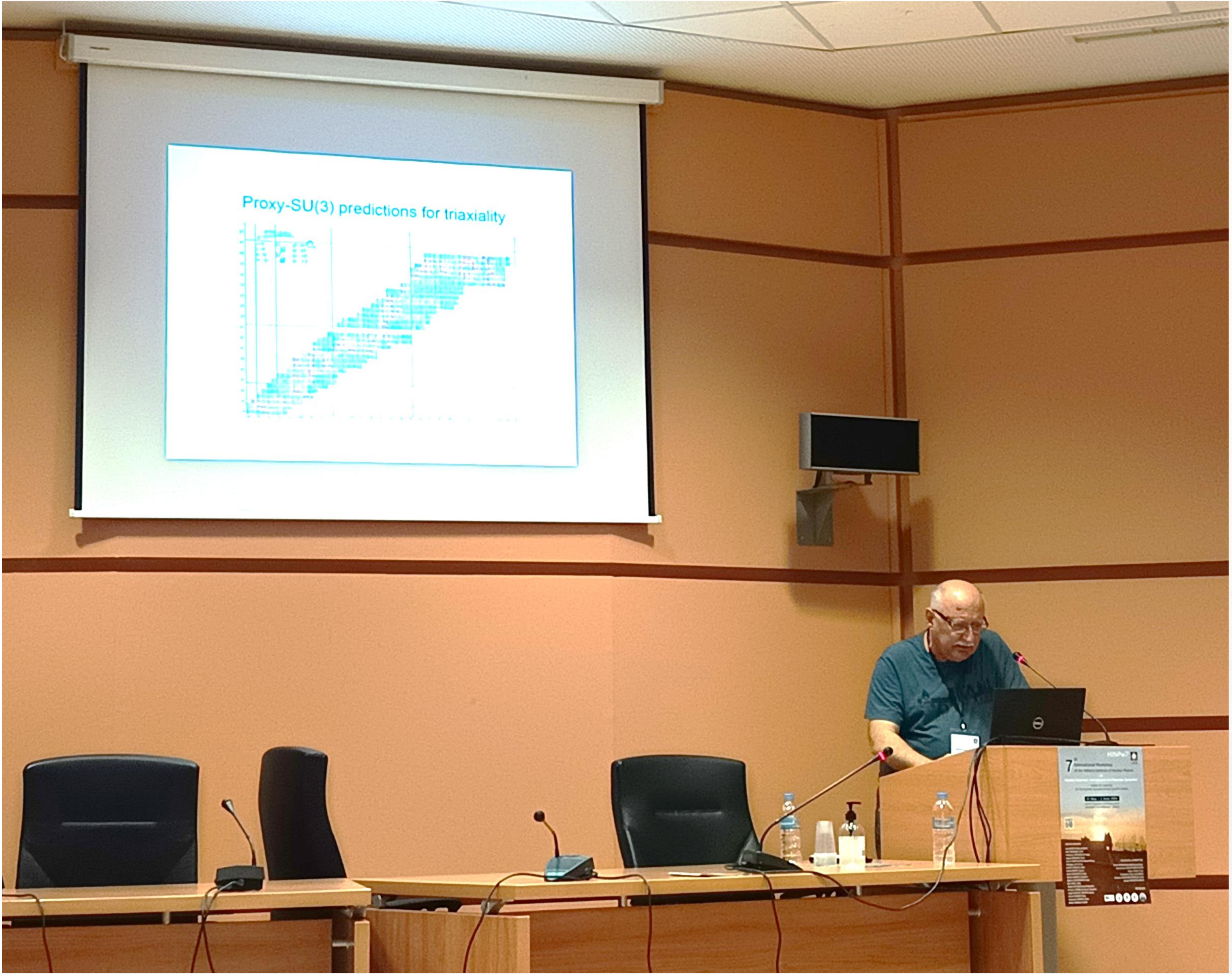

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Session 5

Reaction Dynamics

(II)

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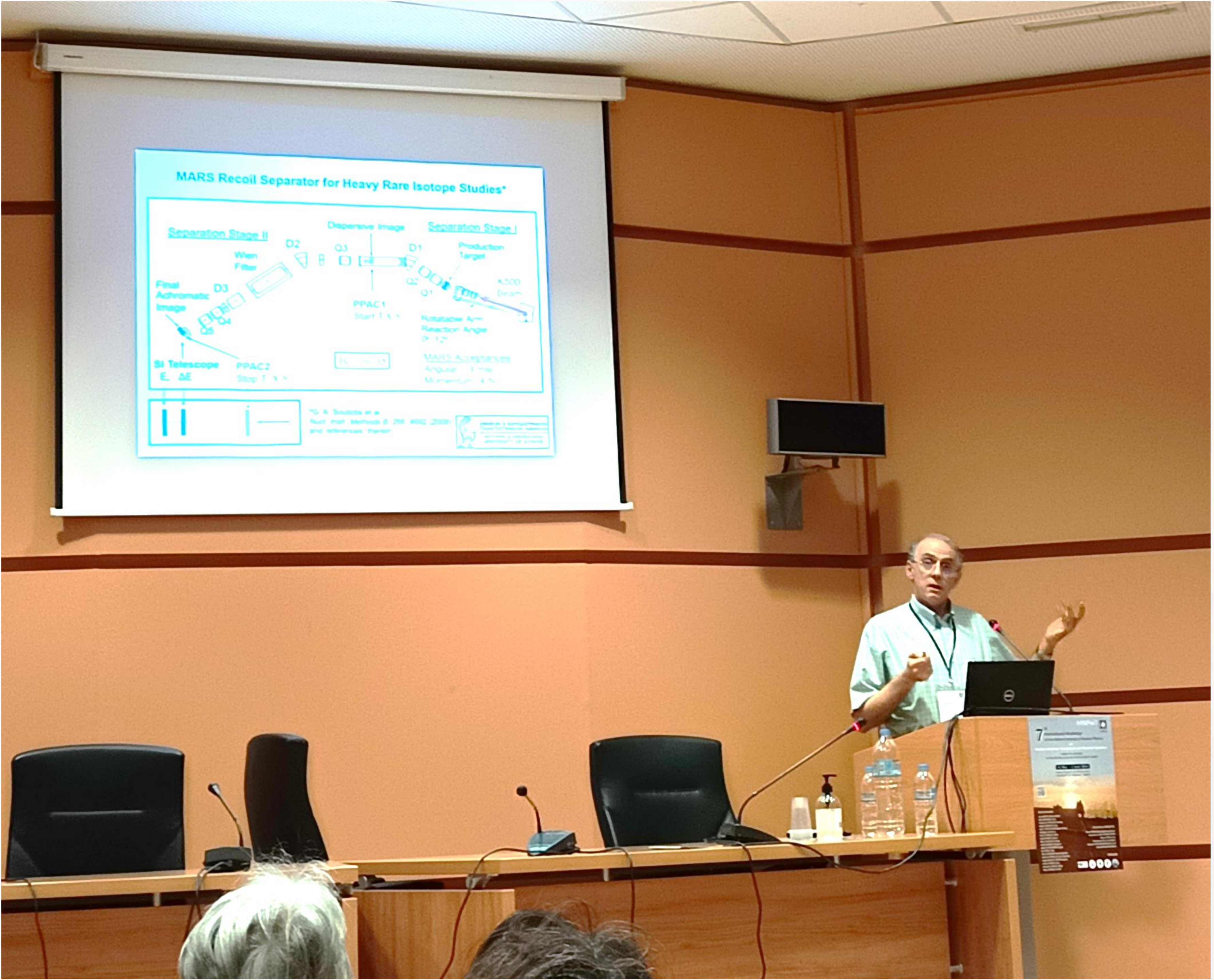

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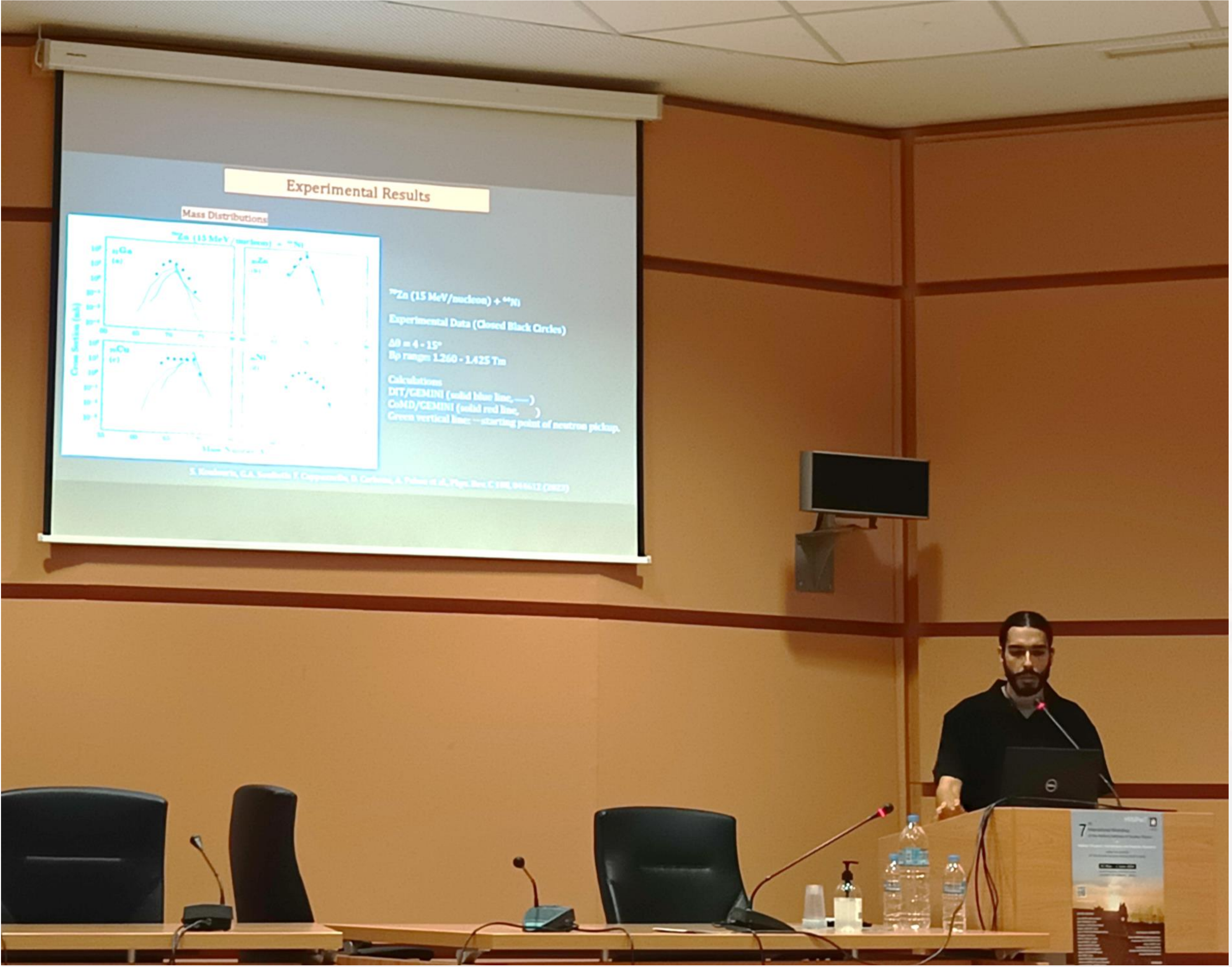

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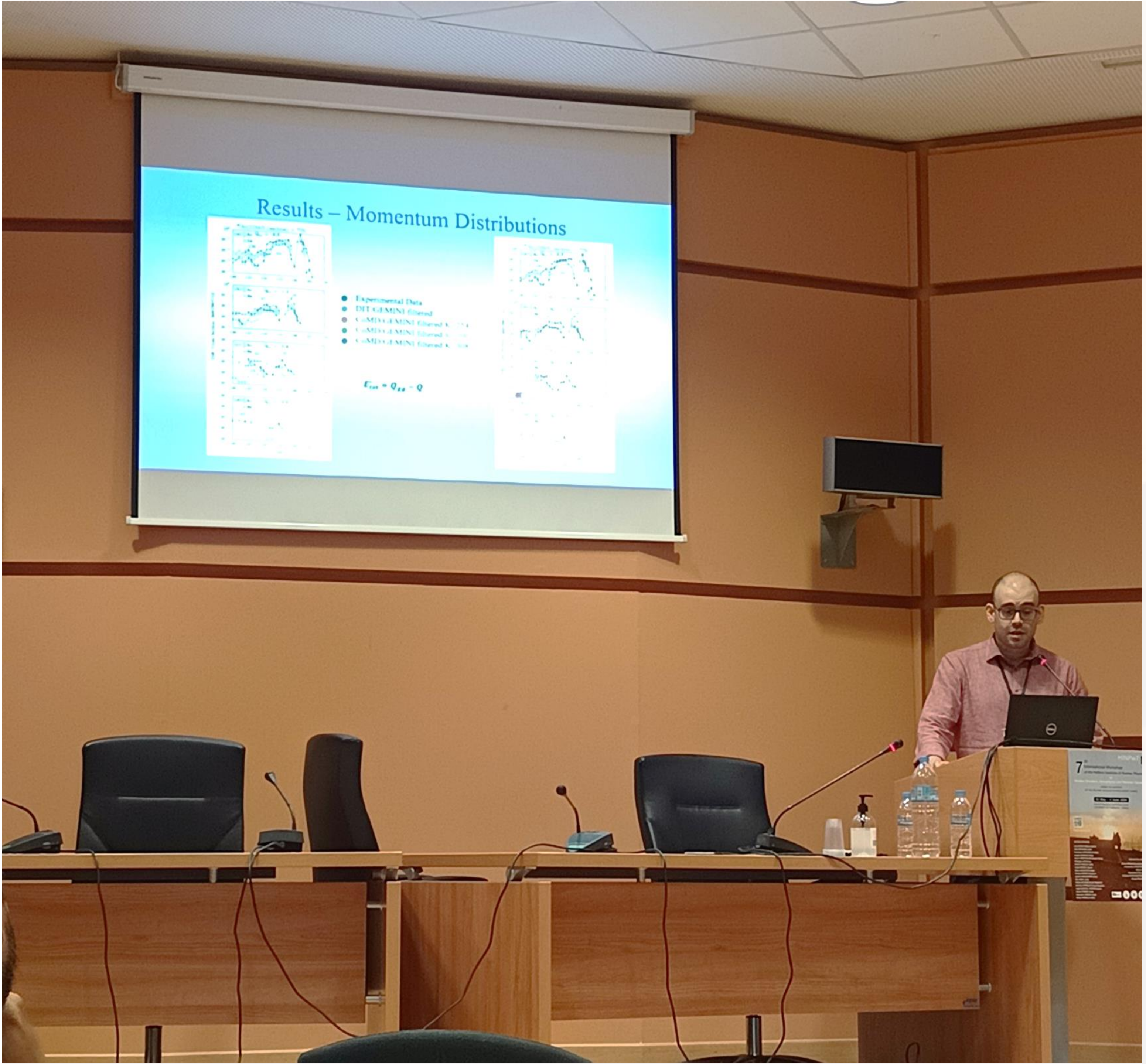

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Chrysi Giannitsa

National and Kapodistrian University of Athens, Greece

Audience

Coffee Breaks

Trip

Ancient Theatre of Dodoni

Trip

Ancient Theatre of Dodoni