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Observation of light shape isomers in the multi-body decay of 252Cf (sf)

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In our previous pablications devoted to the collinear cluster tri-parttition of the low excited nuclei [1, 2] we have discussed the role of scattering medium in the registration of the CCT products. Briefly, even if initially two CCT partners fly in the same direction perfectly collinearly they get some angular divergence after passing the scattering medium on the flight pass due to the multiple scattering. Thanks to such effect they can be registered independently in the "stop" mosaic detector. Actually even thin backing of the radioactive source provides the observable effect. In order to increase it additional absorber (Ti foil) was introduced just after the source at the distance of approximately 1mm. We observe essential mass deficit in the total mass of the fission fragments detected in coincidence with Ti ions knocked out from the foil. It could be expected if the scattered fragment looks like a di-nuclear system destroying due to inelastic scattering on the Ti nucleus. A mean flight time between the Cf source and the foil does not exceed 0.1 ns. It can be regarded as a low limit for the life time of the di-nuclear system (shape-isomer). Possible link of the effect under study and gamma-isomers recently observed in [3] is discussed.

References
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2. Yu. V. Pyatkov et al., Eur. Phys. J. A 48 (2012) 94.
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