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## MARA and RITU, in-flight separators for nuclear structure studies at JYFL

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A new separator, MARA (Mass Analyzing Recoil Apparatus) [1], has recently been constructed at Jyväskylä University ACCLAB. MARA is a vacuum-mode double focusing mass separator. The ion-optical configuration is QQQDEDM. MARA went through an extensive commissioning program during 2016 and already during 2017 MARA was used in spectroscopic studies at and beyond the proton drip line. In these studies, for example, three new isotopes have been identified which is a strong proof itself that MARA fulfills the needed performance.

RITU (Recoil Ion Transport Unit) [2, 3] is a gas-filled recoil separator used to preferentially select recoiling nuclei from primary beam like products after fusion evaporation reactions. RITU is based on a standard DMQQ magnetic configuration, with an extra vertically focusing quadrupole magnet in front of the dispersive element added, thus giving it a QDMQQ configuration. RITU has already been in operation for almost 25 years and a wide-ranging experimental program has been performed during these years.

MARA and RITU represents two different kind of separators having they own pros and cons. They are complementary devices and together they give a freedom to extend substantially the experimental program performed by the Nuclear Spectroscopy Group.

In this work a status report of the JYFL in-flight separators RITU and MARA will be given.

[1] J. Sarén et al., Research Report No. 7/2011, University of Jyväskylä

[2] M. Leino et al., NIMB 99 (1995), 653

[3] J. Sarén et al., NIMA 654 (2011), 508

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