

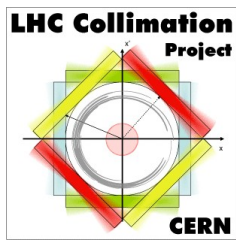
Changes of BLM Thresholds for IR7 Collimators During TS2 - Strategy and Status of Preparation

A. Mereghetti, S. Redaelli, B. Salvachua Ferrando

MPP Meeting, CERN, 14th Aug 2015



Outline



- Motivation for the study;
- Increase in BLM thresholds;
- Conclusions and outlook;

Motivation

- **Run 1** thresholds: **already updated** to **200/500kW**, as proposed by S. Redaelli, B. Salvachua Ferrando, D. Wollmann (2012):

- IR7: LHC-BLM-ECR-0033;
- IR3: LHC-BLM-ECR-0034;

phylosophy:

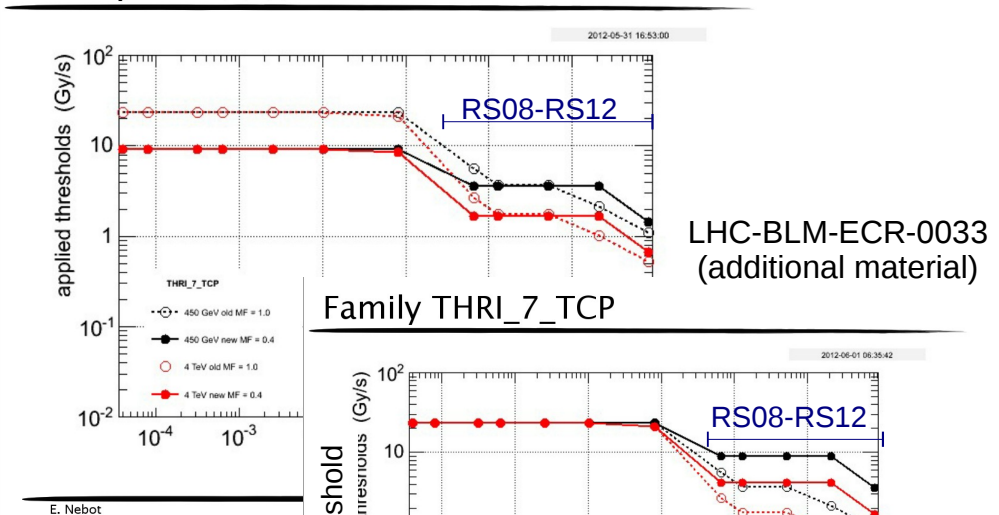
- Changes in **MT**:
 - RS08-RS11: **flattened** to **500kW**;
 - RS12: **200kW**;
 - **MF=0.4**;
 - Required by beam **dumps** on long **RSs**;
- **Run 2: new LHC operational conditions**:
 - Higher beam energy;
 - Slightly different collimator settings;
 → need to newly **update thresholds**;

- Method:

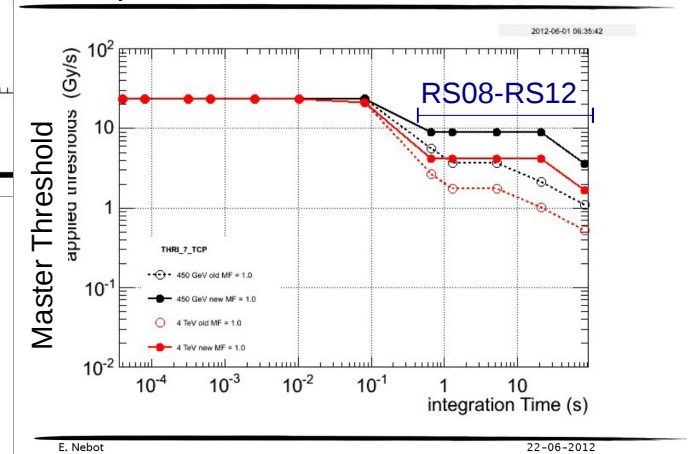
scale **qualification loss maps** (LMs) to a **desired** (target) level of **losses**:

$$D_{th,new}(s) = \frac{D_{LM}(s)}{P_{loss}} P_{tgt}$$

Family THRI_7_TCP

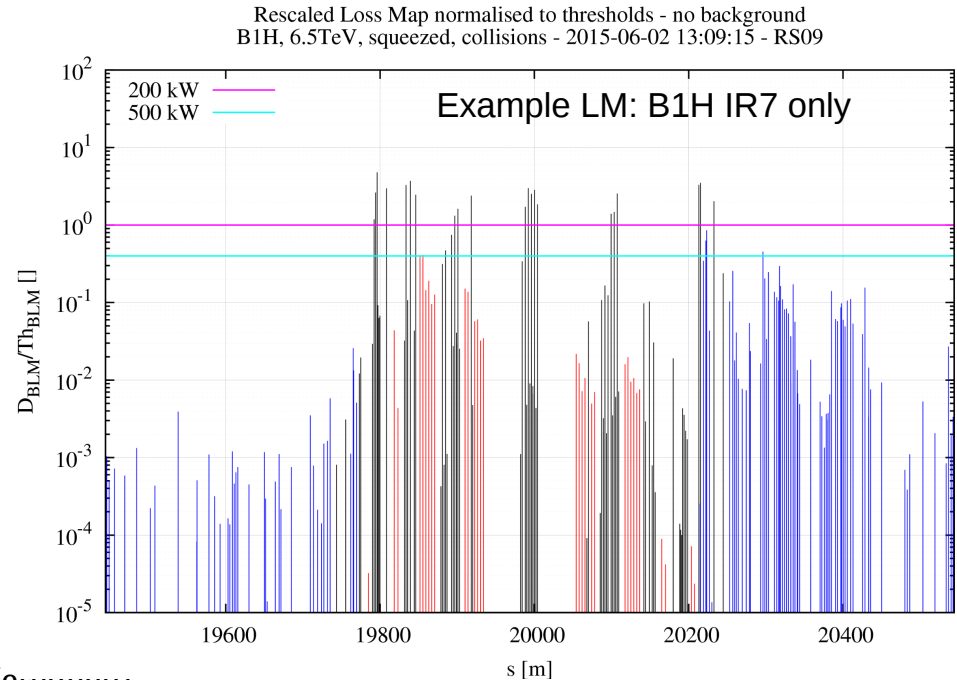
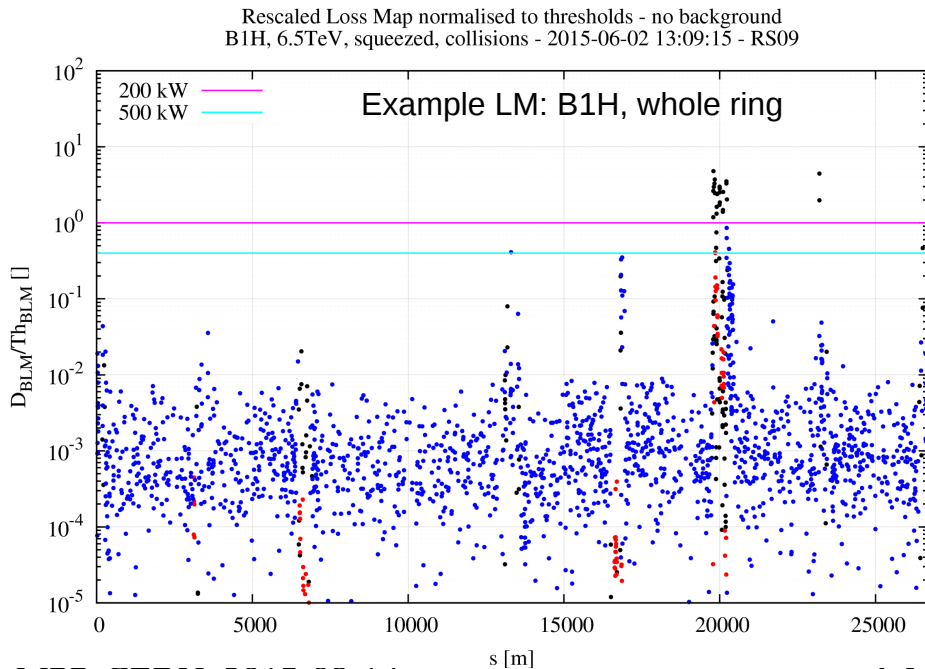


Family THRI_7_TCP



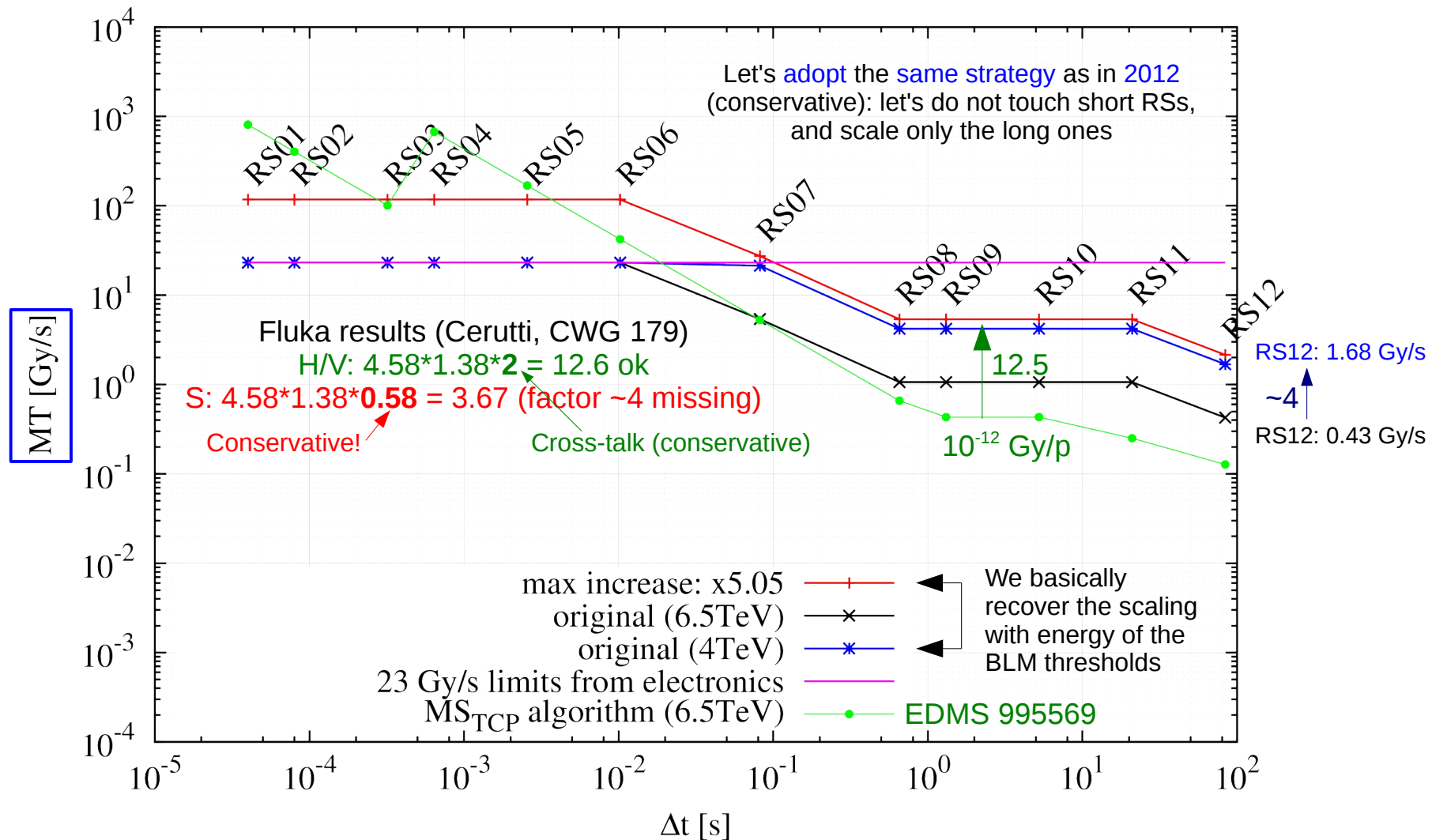
Motivation (II)

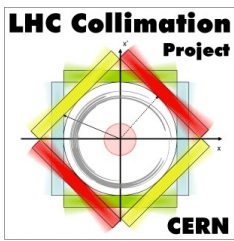
- LMs campaign: Jun 2015;
 - LMs (B1/2,H/V) at FT, with **squeezed** and **colliding beams** (no XRPs);
- LMs are based on RS09 (1.3s integration time):
 - analysis performed on RS09: **scaling factor**;
- For the moment: **IR7 only** (i.e. betatron losses);
 - no particular needs expected on IR3 (for the time being);
- **Design** specifications of **collimation** system at FT (**betatron** cleaning only):
 - 500kW** for **1-10s** and **100kW steady** state;
 - ...but **200kW** in steady state can be tolerated;
 - let's keep these figures on **MT**, and **MF = 0.4** (i.e. **200kW** for 1-10s) as operational setting;



Example: THRI_7_TCP

THRI_7_TCP family - 6.5TeV





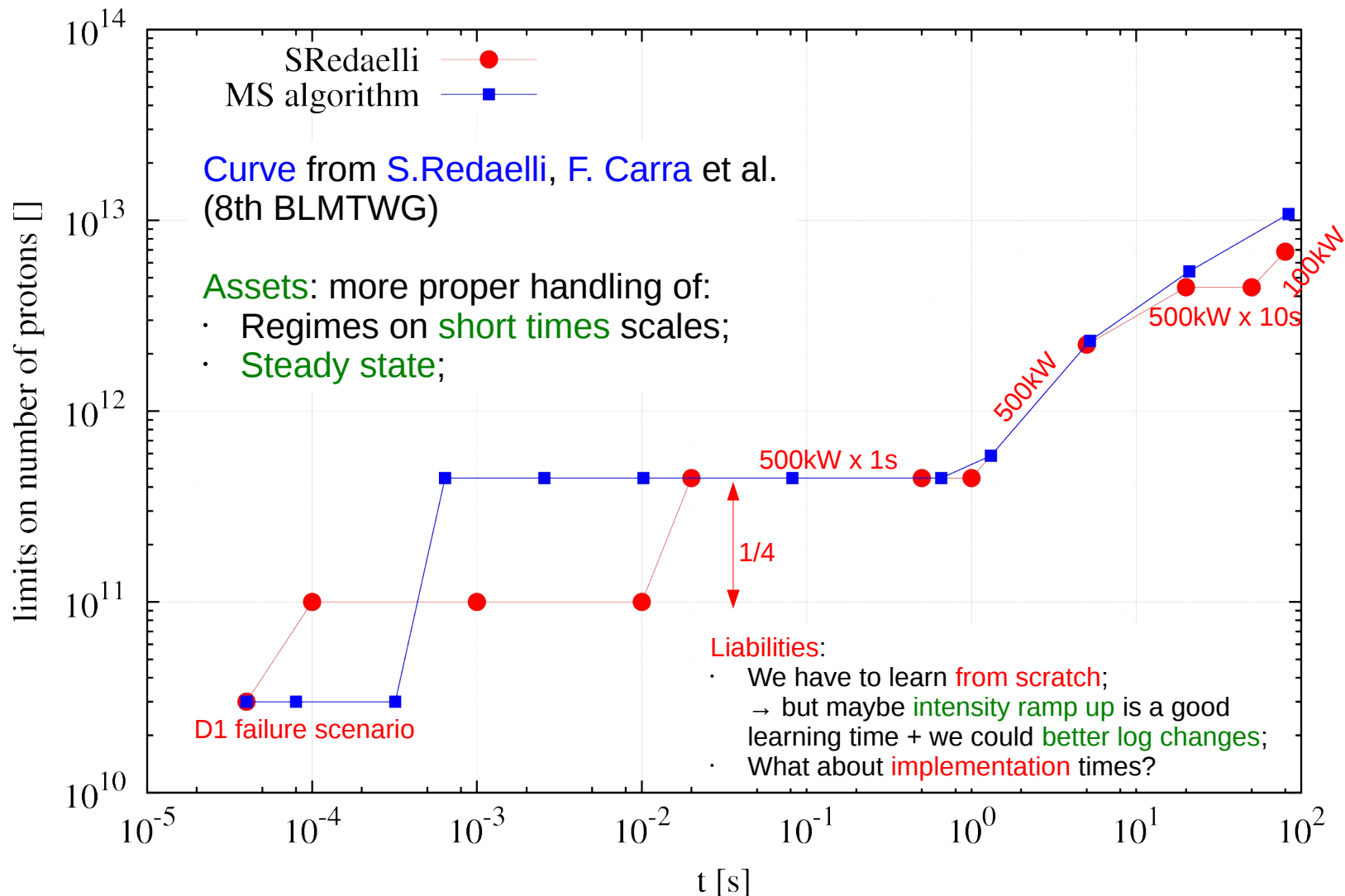
Other Elements

Element	Position	2015	2012
TCT	4L8	2.8	2.3
MQY	4/5 L/R 6	3.4	0.9
MQTL	6 L/R 7	2.2	0.8
MQWA	D/E 5L7	1.15	1.8
MQ	8R7	1.14	0.6

Other elements are involved as well (not for the first time)
→ thresholds of warm magnets are being updated at the same time;

Another Option

limit on number of protons on TCPs - 7 TeV



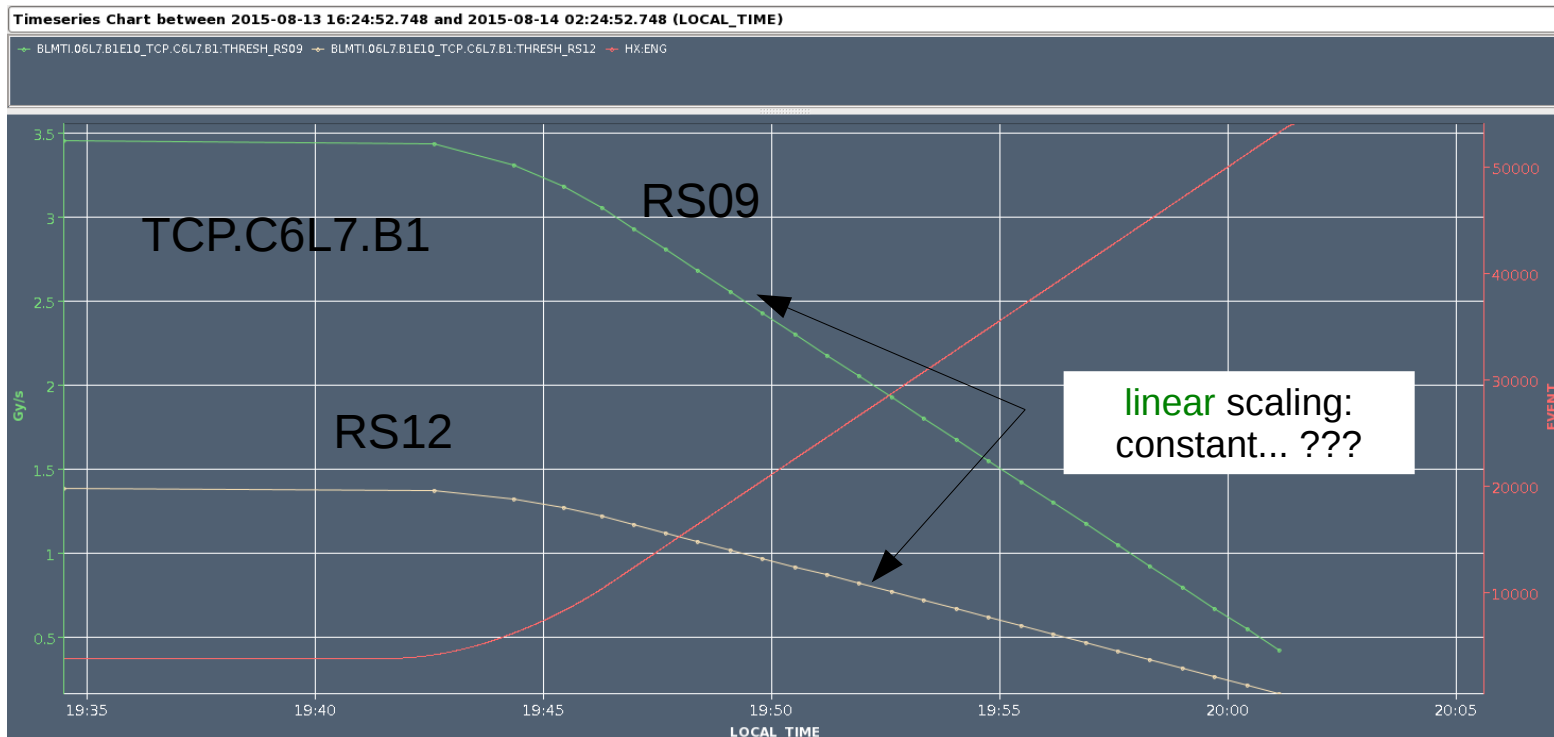
Conclusions

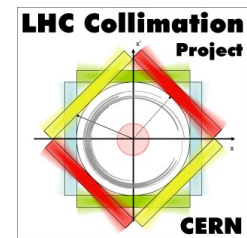
- **Scaling** of Run 1 BLM thresholds to **200kW** and **500kW** beam losses done, based on **qualification loss maps**;
 - Focus: **IR7** (i.e. Betatron losses);
 - LMs: campaign of **Jun 2015**;
 - Scaling performed on basis of **RS09** only;
 - thresholds for **other long RSs** should be increased by the **same factor**;
 - shorter RSs are not touched
 - Increase **factors** are available:
 - Factor **5** at most (**TCP.C6L7**, **B1V**);
 - Some BLMs **not** at **IR7 collimators** are **involved** as well – factor **3** at most (**MQY.05L6**, **B2H**);
 - Protection of collimators at **500kW** (**estimated** limits):
 - Factor ~4 above limit for S primary collimator;
 - Factor ~20 above limit for TCSG collimators (no cross-talk - conservative);
 - Factor ~22 above limit for TCLA collimators (those hit by showers started in TCPs of the other beam - previously: 400, LHC-BLM-ECR-0010);
 - we start anyway with 200kW: we believe anyway that these figures can be tolerated;

Outlook

- Implement the **new curve** of **allowed proton losses** from **S.Redaeli, F. Carra** et al. (8th BLMTWG);
- Better describe the dependence of **MT** on **beam energy**;
 → allowed proton losses scale with beam energy, keeping constant power losses:
$$N_p(E_b) = \frac{P}{E_b}$$
- Extend studies on **signal per impacting proton** (a.k.a. “Fluka Factors”):
 - Dependence on **energy**;
 - Dependence on **material** (Cu and W);
 - Empirically measure cross-talk? (as done in **2010**);

Rectangular **hyperbola**:
constant power

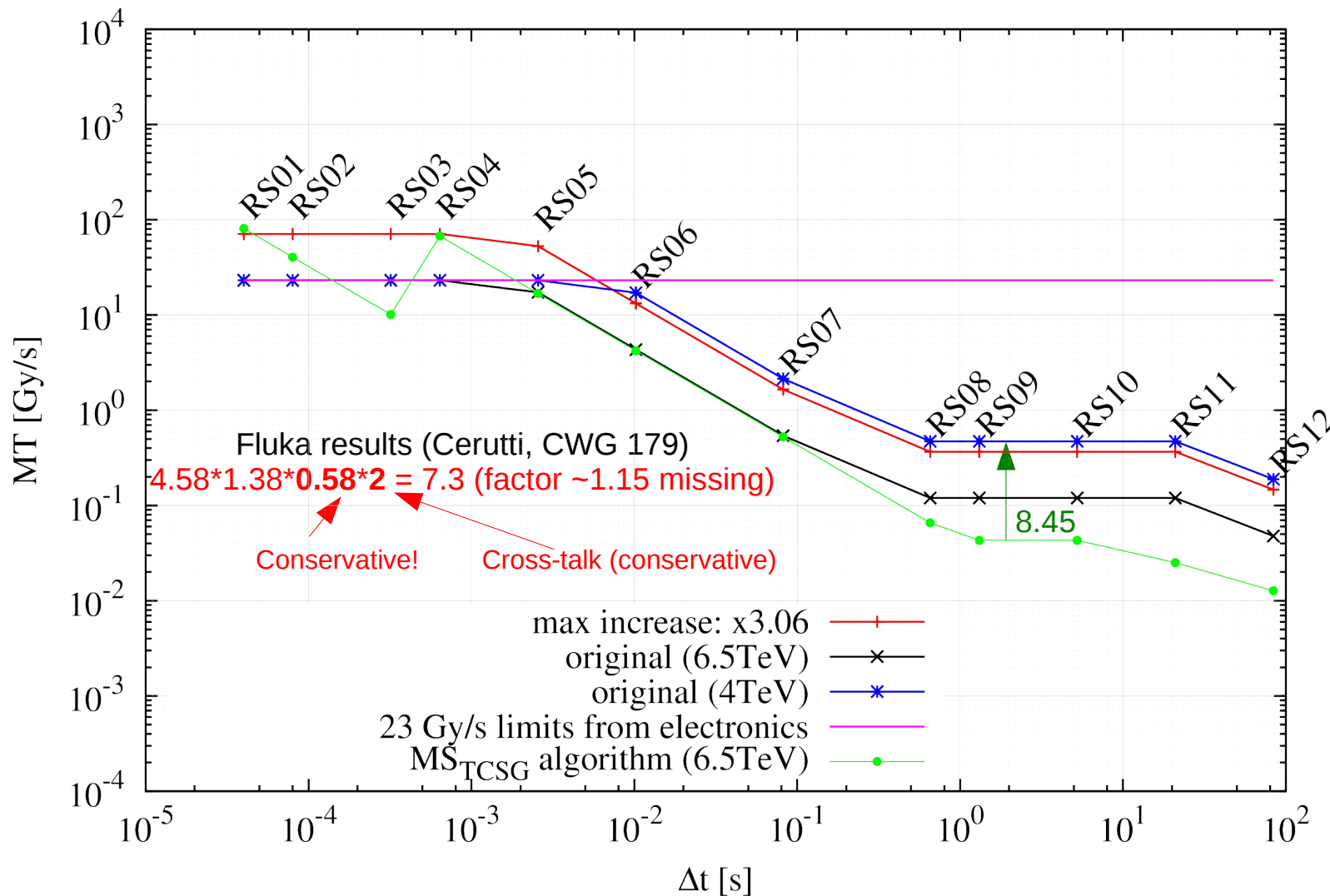




Back Up Slides

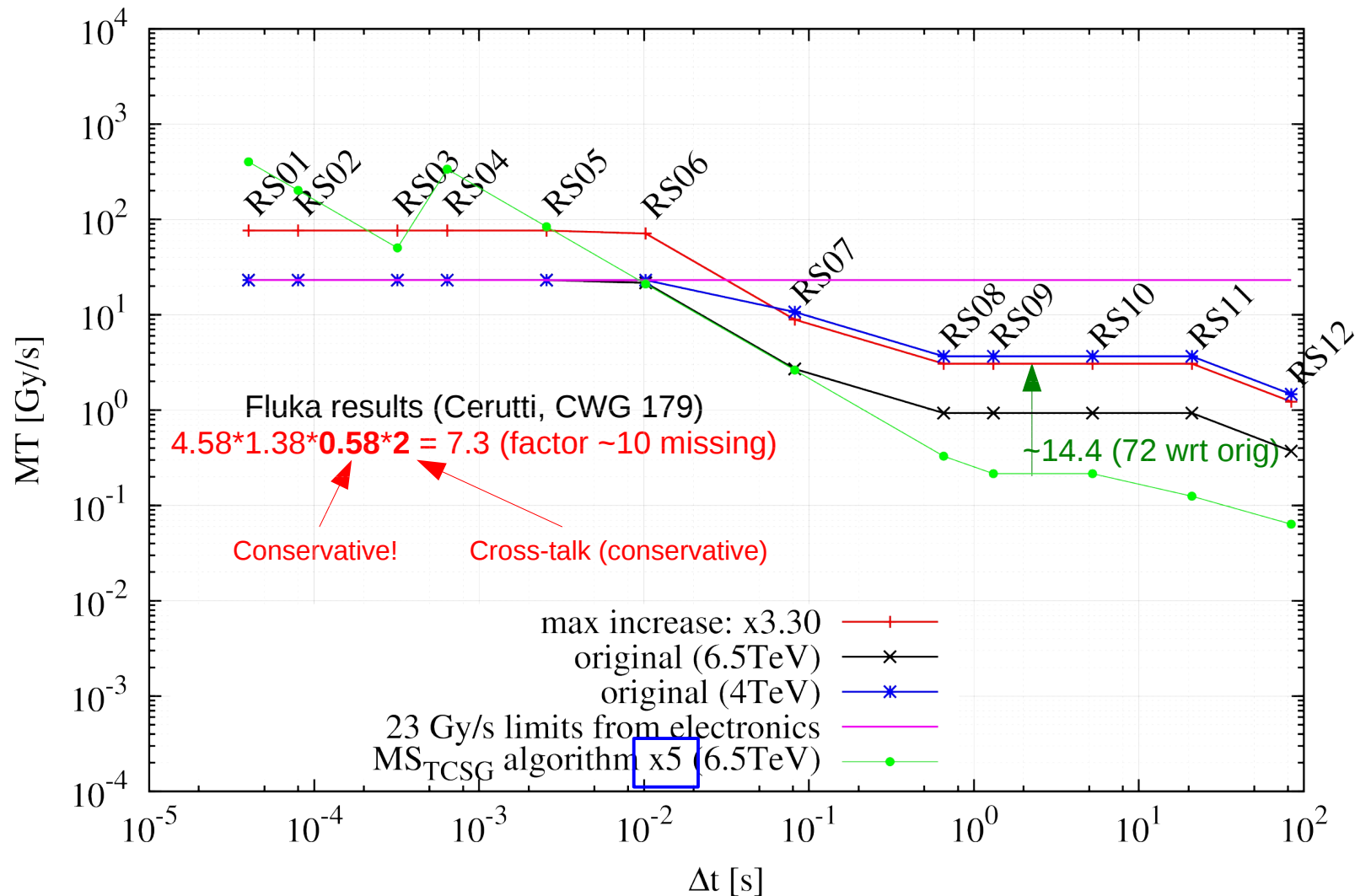
THRI_7_TCSG

THRI_7_TCSG - 6.5TeV



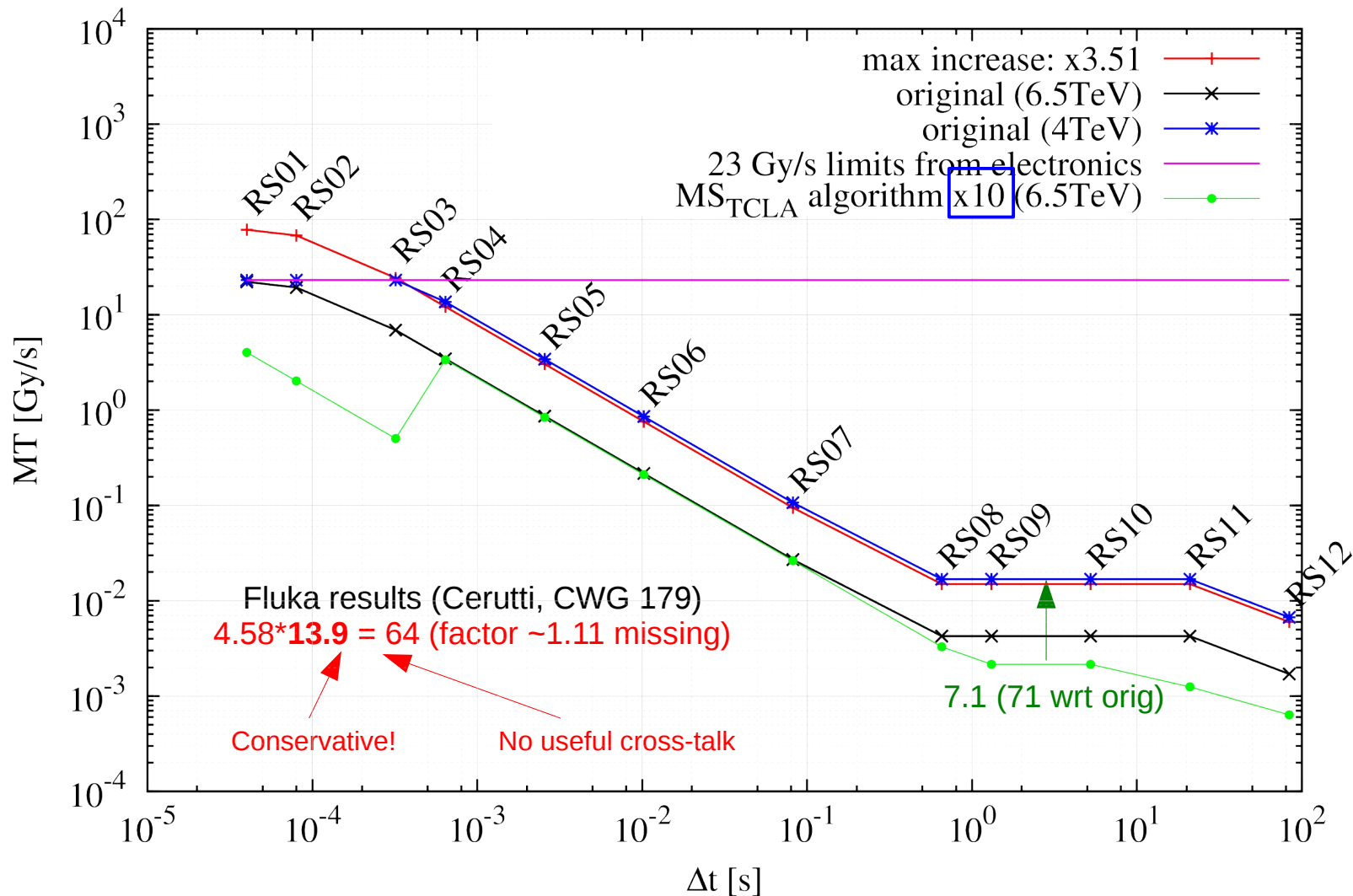
THRI_7_TCSG_F5

THRI_7_TCSG_F5 - 6.5TeV



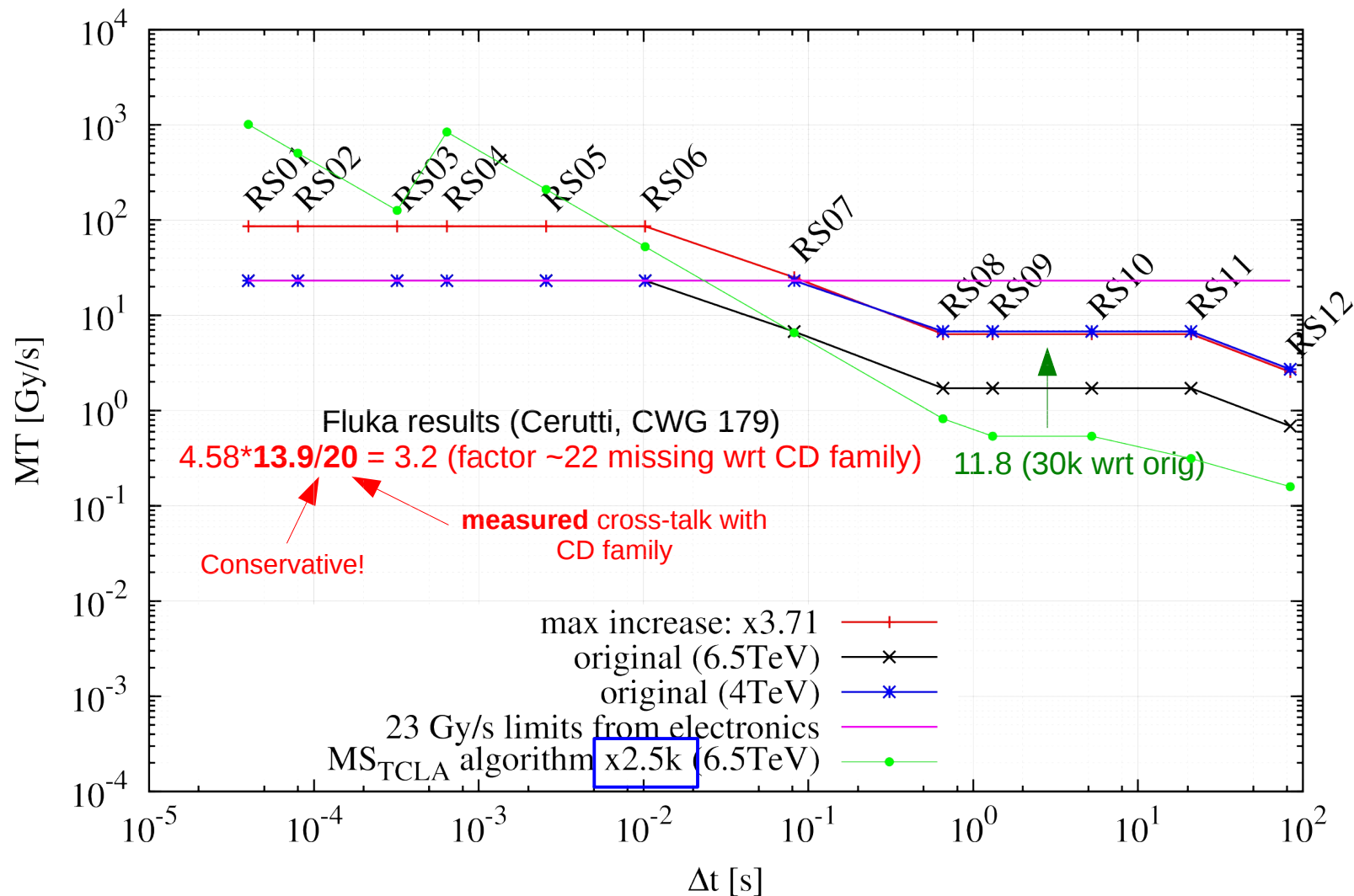
THRI.06_7_CD_TCLA

THRI.06_7_CD_TCLA - 6.5TeV



THRI.06_7_AB_TCLA

THRI.06_7_AB_TCLA - 6.5TeV



THRI.07_7_AB_TCLA

THRI.07_7_AB_TCLA - 6.5TeV

