Dear Editor,

On behalf of the other co-authors I enclose the revised manuscript entitled *“Fast Methods For Finding Significant Motifs on Labeled Multi-Relational Networks”*. We thank the reviewers for their detailed and helpful comments. Their suggestions have helped to improve the manuscript. We have addressed all the reviewers’ comments. Detailed responses are given below (reviewers’ comments are in italics).

Best Regards,

Alfredo Pulvirenti

**Reviewer: 1**

1. (1) Eq. (3.1)

The authors defined a probabilistic model for generating a random graph.

In Eq. (3.1), the minimum of 1 and some term is taken.

It is curios because it is not necessary to take min if the term gives a probability.

*The reviewer is right, the EDD model could yield edge probabilities greater than 1. Therefore, this correction is necessary to obtain reliable results. The model is implemented to avoid such a shortcoming. However, all the equations hold even with the minimum. To increase the readability of the paper we have removed the minimum in the definition of probability and put a footnote into the paper to explain its meaning.*

1. Even if Eq. (3.1) is just a definition, the effect of min is not taken into account in the following analysis.

It is also very curious.

*We agree. We have restructured the analysis without using the minimum.*

1. (2) Eqs. (3.2)-(3.3)

I cannot see the meanings of $\eta\_L^{m\_L/2}$ and $\eta\_L^{m\_L}$.

*We have restructured the paper and we provide a detailed proof which allow to see that \eta^{…} appears as a result of marginalization during the computation of motif probability.*

1. (3) Eq. (3.4)

It seems that $\mu(M)$ depends only on (in and out) degrees of the motif and does not depend on the structure of the motif.

It is also curious.

*The probability of the motif depends on the topology of the motif. The probability is strictly related to the moments of the degree distribution, and these moments are related the degree of the nodes in the motif. We clearly describe this through the paper.*

1. If the analysis is exact, the results must be given as theorems with rigorous and detailed proofs.

*We have restructured the definitions of the concepts used through the paper. We have also proved the key lemmas to allow the reader to understand how the probability of the motif is obtained.*

**Reviwer 2**

1. The organization of a mathematically oriented paper is well established: introduction, definitions and preliminary results, new results and, finally, numerical experiments and conclusions. For better readability and understanding, the content of Section 3 should be placed before Section 2.

*We have restructured the paper according to the Reviewer suggestion.*

1. \_ Page 2 line 40: The abbreviation ‘ED’ should be ‘ER’. By the way, abbreviations are not very useful in the Introduction, since the authors always use the full names (e.g., ‘Erd¨os-R´enyi’, ‘Fixed Degree Distribution’, etc.) along with the abbreviated versions (‘ER’, ‘FDD’, etc.).

*Fixed*

1. \_ page 5: In line 14–15 the symbol \alpha denotes a threshold while in line 19–20 it denotes a p-value.

*Fixed*

1. \_ In page 6, the notation P(G) is sometimes written as P(G). The same notation is written as PG in page 11 line 46.

*Fixed*

1. \_ Page 12: the symbol G is erroneously written T in line 37 and line 49.

*Fixed*

1. \_ Page 13 line 48: the term ‘exchangeable random model’ should be explained.

*We have better explained the meaning of “exchangeable random model”.*

1. \_ Page 15 line 15: there is an unwanted ‘he’.

*Fixed*