**Table S1: Purified proteins used in this study**

|  |  |  |
| --- | --- | --- |
| **Name** | **Details** | **Amino acid sequence** |
| **UBF:** Upstream Binding Transcription factor | Uniprot: P17480**; D/E-tract bolded**; Source plasmid- pMK137 (Human) | GMNGEADCPTDLEMAAPKGQDRWSQEDMLTLLECMKNNLPSNDSSKFKTTESHMDWEKVAFKDFSGDMCKLKWVEISNEVRKFRTLTELILDAQEHVKNPYKGKKLKKHPDFPKKPLTPYFRFFMEKRAKYAKLHPEMSNLDLTKILSKKYKELPEKKKMKYIQDFQREKQEFERNLARFREDHPDLIQNAKKSDIPEKPKTPQQLWYTHEKKVYLKVRPDATTKEVKDSLGKQWSQLSDKKRLKWIHKALEQRKEYEEIMRDYIQKHPELNISEEGITKSTLTKAERQLKDKFDGRPTKPPPNSYSLYCAELMANMKDVPSTERMVLCSQQWKLLSQKEKDAYHKKCDQKKKDYEVELLRFLESLPEEEQQRVLGEEKMLNINKKQATSPASKKPAQEGGKGGSEKPKRPVSAMFIFSEEKRRQLQEERPELSESELTRLLARMWNDLSEKKKAKYKAREAALKAQSERKPGGEREERGKLPESPKRAEEIWQQSVIGDYLARFKNDRVKALKAMEMTWNNMEKKEKLMWIKKAAEDQKRYERELSEMRAPPAATNSSKKMKFQGEPKKPPMNGYQKFSQELLSNGELNHLPLKERMVEIGSRWQRISQSQKEHYKKLAEEQQKQYKVHLDLWVKSLSPQDRAAYKEYISNKRKSMTKLRGPNPKSSRTTLQSK**SESEEDDEEDEDDEDEDEEEEDDENGDSSEDGGDSSESSSEDESEDGDENEEDDEDEDDDEDDDEDEDNESEGSSSSSSSSGDSSDSDS**NENLYFQ |
| **UBF∆D/E-tract** | Uniprot: P17480**;** C-terminal D/E-tract removed; Source plasmid- pMK152 (Human) | GMNGEADCPTDLEMAAPKGQDRWSQEDMLTLLECMKNNLPSNDSSKFKTTESHMDWEKVAFKDFSGDMCKLKWVEISNEVRKFRTLTELILDAQEHVKNPYKGKKLKKHPDFPKKPLTPYFRFFMEKRAKYAKLHPEMSNLDLTKILSKKYKELPEKKKMKYIQDFQREKQEFERNLARFREDHPDLIQNAKKSDIPEKPKTPQQLWYTHEKKVYLKVRPDATTKEVKDSLGKQWSQLSDKKRLKWIHKALEQRKEYEEIMRDYIQKHPELNISEEGITKSTLTKAERQLKDKFDGRPTKPPPNSYSLYCAELMANMKDVPSTERMVLCSQQWKLLSQKEKDAYHKKCDQKKKDYEVELLRFLESLPEEEQQRVLGEEKMLNINKKQATSPASKKPAQEGGKGGSEKPKRPVSAMFIFSEEKRRQLQEERPELSESELTRLLARMWNDLSEKKKAKYKAREAALKAQSERKPGGEREERGKLPESPKRAEEIWQQSVIGDYLARFKNDRVKALKAMEMTWNNMEKKEKLMWIKKAAEDQKRYERELSEMRAPPAATNSSKKMKFQGEPKKPPMNGYQKFSQELLSNGELNHLPLKERMVEIGSRWQRISQSQKEHYKKLAEEQQKQYKVHLDLWVKSLSPQDRAAYKEYISNKRKSMTKLRGPNPKSSRTTLQSENLYFQ |
| **LYAR:** Ly1-antibody reactive | Uniprot- Q6GP45; **K/E-block IDR bolded**; Source plasmid- pMK39  (Xenopus laevis) | GSSMVFFTCNACGESLKKGQVEKHRGMCRNCGCLSCIDCGKDFRGDDYKNHLKCISEDQKYGGKAFEAKANKGDVKQQQWLQRIQEIMKKPSISPNIRNILNQMSSYENIPRKKAKFQNWMKNSLKIHNQTIHDQVWEIFAEA**TSSAPSNQEKQKQPEISVSEDKSEQAPQVVEENGKKKSKRERKEERQKKNKKEKKDLVEEQMETAEKKKSKKRKMEEDEVPSETEVSVEKKKKKKKHHDEDEIDGESQEETSQITEEEGEQQEENGEDESADVDVESNETARGKFNW**KGTIKAVLRKAPDNELPIKSLRKKVLAQYYAVSSEQHKSEKDLLIAFNKKIQNNPKFRVLKERVKLLK |
| **NUCKS:** Nuclear ubiquitous casein and cyclin-dependent kinase substrate 1 | Uniprot- Q9H1E3; **K-rich region bolded** Source plasmid- pMK106 (Human) | GTMSRPVRNRKVVDYSQFQESDDADEDYGRDSGPPTKKIRSSPREAKNKRRSGKNSQEDSEDSEDKDVKTKKDDSHSAEDSEDEKEDHKNVRQQRQAASKAASKQREMLMEDVGSEEEQEEEDEAPFQEKDSGSDEDFLMEDDDDSDYG**SSKKKNKKMVKKSKPERKEKKMPKPRLKATVTPSPVKGKGKVGRPTASKASKEKT**PSPKEEDEEPESPPEKKTSTSPPPEKSGDEGSEDEAPSGEDSGGTENLYFQ |
| **NUCKS ∆K-rich** | Uniprot- Q9H1E3; Source plasmid- pMK141  (Human) | GMSRPVRNRKVVDYSQFQESDDADEDYGRDSGPPTKKIRSSPREAKNKRRSGKNSQEDSEDSEDKDVKTKKDDSHSAEDSEDEKEDHKNVRQQRQAASKAASKQREMLMEDVGSEEEQEEEDEAPFQEKDSGSDEDFLMEDDDDSDYGPSPKEEDEEPESPPEKKTSTSPPPEKSGDEGSEDEAPSGEDGSGENLYFQ |
| **PolRIF\_IDR:** RNA polymerase I subunit F | a.a. 204-338 (End); Uniprot- Q3B726  Source plasmid- pMK140  (Human) | GSGSGKRSEVSEEVTENGTEEAAKKPKKKKKKKDPETYEVDSGTTKLADDADDTPMEESALQNTNNANGIWEEEPKKKKKKKKHQEVQDQDPVFQGSDSSGYQSDHKKKKKKRKHSEEAEFTPPLKCSPKRKGKSNFLGGENLYFQG |
| **NCL**: Nucleolin | Uniprot- Q06459; **D/E-tract and RG-rich IDRs bolded**; Source plasmids: pMK55 and pMK78  (Xenopus laevis) | **GMVKLAKGAKTQAKPKKAAPPPPKDMDDSDEEEDSEDESSEEEMEVPVKKTPAKKAATPAKATPGKAATPAKATVTPGKKGATPGAKNGKQAKKQESEEEEDDSDEEDQKPIKKPIAKKAVAKKEESEEDDEDEDEDESEEEKPVAKRPLAKNPPVKVTPAKKSTGKKQESDDEEDESEEEKPVAKKPPAKKPAGKKQESEDEESDEDEEEPMEVASAQKGKKTAPAKAEDDDDDDDDDDDDDDEDDEEDDDDE**QQGPAKRKKEMPKNNVPEAKKTKTDTASEGFSIFIGNLNSTLDFDELKDALREFFSKKNLTIQDVRIGGSKKFGYVDFSSEEEVEKALKLSGKKILGLEVKIEKAVAFDKNKNAENKKERDSRTLFVKNIPYSTSAEELQEIFENAKDIRIPTGNDGSNKGIAYVEFSTEAEANKALEEKQGAEIEGRSLFVDFTGEKSQNSGGRRGPAGDSKVLVVNNLSYSATEDSLREVFEKATSIRIPQNQGRAKGFAFVEFSSMEDAKEAMDSCNNTEVEGRSIRLEFSQGGGPQGGGRGGSVQSKTLFVRGLSEDTTEETLKEAFDGSINARIVTDRDTGASKGFGFVDFSSAEDAKAAREAMEDGEIDGNKVTLDFAKPKGDSQ**RGGRGGFGGGRGGFGGRGGGRGGFGGRGGGRGGFGGRGGGGGRGRGGFGGRGGGGFGGGNQGQG**KKIRFDD |
| **NCL∆D/E-tract** | Uniprot- Q06459 Source plasmid: pMK147  (Xenopus laevis) | MVKLAQGPAKRKKEMPKNNVPEAKKTKTDTASEGFSIFIGNLNSTLDFDELKDALREFFSKKNLTIQDVRIGGSKKFGYVDFSSEEEVEKALKLSGKKILGLEVKIEKAVAFDKNKNAENKKERDSRTLFVKNIPYSTSAEELQEIFENAKDIRIPTGNDGSNKGIAYVEFSTEAEANKALEEKQGAEIEGRSLFVDFTGEKSQNSGGRRGPAGDSKVLVVNNLSYSATEDSLREVFEKATSIRIPQNQGRAKGFAFVEFSSMEDAKEAMDSCNNTEVEGRSIRLEFSQGGGPQGGGRGGSVQSKTLFVRGLSEDTTEETLKEAFDGSINARIVTDRDTGASKGFGFVDFSSAEDAKAAREAMEDGEIDGNKVTLDFAKPKGDSQRGGRGGFGGGRGGFGGRGGGRGGFGGRGGGRGGFGGRGGGGGRGRGGFGGRGGGGFGGGNQGQGKKIRFDD\* |
| **NPM1:** Nucleophosmin | Uniprot - P07222 Source plasmids: pMK59 and pMK61 (Xenopus laevis) | MEDSMDMDNIAPLRPQNFLFGCELKADKKEYSFKVEDDENEHQLSLRTVSLGASAKDELHVVEAEGINYEGKTIKIALASLKPSVQPTVSLGGFEITPPVILRLKSGSGPVYVSGQHLVALEDLESSDDEDEEHEPSPKNAKRIAPDSASKVPRKKTRLEEEEEDSDEDDDDDDEDDDDEDDDEEEEETPVKKTDSTKSKAAQKLNHNGKASALSTTQKTPKTPEQKGKQDTKPQTPKTPKTPLSSEEIKAKMQTYLEKGNVLPKVEVKFANYVKNCFRTENQKVIEDLWKWRQSLKDGK |
| **pHluorin2** | Syntheitic; generated via directed evolution in Mahon et al.129; Source plasmid pMK169 | MVSKGEELFTGVVPILVELDGDVNGHKFSVSGEGEGDATYGKLTLKFICTTGKLPVPWPTLVTTLSYGVQCFSRYPDHMKQHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTLVNRIELKGIDFKEDGNILGHKLEYNYNEHLVYIMADKQKNGTKAIFQVHHNIEDGSVQLADHYQQNTPIGDGPVLLPDNHYLHTQSALSKDPNEKRDHMVLLEFVTAAGITHGMDELYK\* |

**Table S2: Energies used in LaSSI simulations**

|  |  |
| --- | --- |
| **Pairwise interaction types and energies used in LaSSI simulations** | **Energy** |
| DNA – DNA sticker | -10 |
| DNA – K-block | -10 |
| K-block - D/E-block | -10 |
| DNA – DNA | -1 |
| D/E-block – D/E-block | -1 |
| DNA – D/E-block | -1 |
| K-block – K-block | -1 |
| Other (including spacer interactions) | -3 |