

Publication list Frank Gabel

2019

Danilenko, N., Lercher, L., Kirkpatrick, J., Gabel, F., Codutti, L. and Carlomagno, T. (2019) Histone chaperone exploits intrinsic disorder to switch 1 acetylation specificity. *Nat. Commun.* [accepted]

*Lapinaite, A., Carlomagno, T. and Gabel, F. (2019) Small angle neutron scattering of RNA-protein complexes. *Methods Mol. Biol.* [in press]

*Gabel, F., Engilberge, S., Pérez, J. and Girard, E. (2019) Medical contrast media as possible tools for SAXS contrast variation. *IUCrJ* 6, 521-525.

2018

Ashkar, R., Bilheux, H.Z., Bordallo, H., Briber, R., Callaway, D.J.E., Cheng, X., Chu, X.Q., Curtis, J.E., Dadmun, M., Fenimore, P., Fushman, D., Gabel, F., Gupta, K., Herberle, F., Heinrich, F., Hong, L., Katsaras, J., Kelman, Z., Kharlampieva, E., Kneller, G.R., Kovalevsky, A., Krueger, S., Langan, P., Lieberman, R., Liu, Y., Losche, M., Lyman, E., Mao, Y., Marino, J., Mattos, C., Meilleur, F., Moody, P., Nickels, J.D., O'Dell, W.B., O'Neill, H., Perez-Salas, U., Peters, J., Petridis, L., Sokolov, A.P., Stanley, C., Wagner, N., Weinrich, M., Weiss, K., Wymore, T., Zhang, Y. and Smith, J.C. (2018) Neutron scattering in the biological sciences: progress and prospects. *Acta Crystallogr. D Struct. Biol.* 74(Pt 12), 1129-1168.

*Dias Mirandela, G., Tamburrino, G., Ivanović, M., Strnad, F., Byron, O., Rasmussen, T., Hoskisson, P., Hub, J., Zachariae, U., Gabel, F. and Javelle, A. (2018) Merging In-Solution X-Ray and Neutron Scattering Data Allows Fine Structural Analysis of Membrane-Protein Detergent Complexes. *J. Phys. Chem. Lett.* 9, 3910-3914.

Kooshapur, H., Choudhury, N. R., Simon, B., Mühlbauer, M., Jussupow, A., Fernandez, N., Jones, A. N., Dallmann, A., Gabel, F., Camilloni, C., Michlewski, G., Caceres, J. F. and Sattler, M. (2018) Structural basis for terminal loop recognition and stimulation of pri-miRNA-18a processing by hnRNP A1. *Nat. Commun.* 9(1), 2479.

*Mahieu, E. and Gabel, F. (2018) Biological small angle neutron scattering: recent results and developments. *Acta Crystallogr. D Biol. Crystallogr.* 74(Pt 8), 715-726.

2017

*Gabel, F. (2017) Applications of SANS to study membrane protein systems. *Adv. Exp. Med. Biol.* 1009, 201-214.

Zhang, J., Scott, W. R., Gabel, F., Wu, M., Desmond, R., Bae, J. H., Zaccai, G., Algar, W. R., Straus, S. K. (2017) On the quest for the elusive mechanism of action of daptomycin: binding, fusion, and oligomerization. *BBA Proteins and Proteomics* 1865(11 Pt B), 1490-1499

Trewhella, J., Duff, A. P., Durand, D., Gabel, F., Guss, J. M., Hendrickson, W. A., Hura, G. L., Jacques, D. A., Kirby, N. M., Kwan, A. H., Pérez, J., Pollack, L., Ryan, T. M., Sali, A., Schneidman-Duhovny, D., Schwede, T., Svergun, D. I., Sugiyama, M., Tainer, J. A., Vachette, P., Westbrook, J. and Whitten, A. E. (2017) 2017 publication guidelines for structural modelling of small-angle scattering data from biomolecules in solution: an update. *Acta Crystallogr. D Biol. Crystallogr.* 73(Pt 9), 710-728.

Sonntag, M., Jagtap, P., Simon, B., Appavou, M.-S., Geerlof, A., Stehle, R., Gabel, F., Hennig, J. and Sattler, M. (2017) Segmental, domain-selective perdeuteration and small angle neutron scattering for structural analysis of multi-domain proteins. *Angew. Chem. Int. Ed.* 56(32), 9322-9325.

Cao, S., Engilberge, S., Girard, E., Gabel, F., Franzetti, B. and Maupin-Furlow, J. A. (2017) Structural insight into ubiquitin and ubiquitin-like protein recognition and oligomeric states of JAMM/MPN+ proteases. *Structure* 25(6), 823-833.

*Ibrahim, Z., Martel, A., Moulin, M., Kim, H.S., Härtleln, M., Franzetti, B. and Gabel, F. (2017) Time-resolved neutron scattering provides new insight into protein substrate processing by a AAA+ unfoldase. *Sci. Rep.* 7, 40948.

2016

*Kim, H., Martel, A., Girard, E., Moulin, M., Härtleln, M., Madern, D., Blackledge, M., Franzetti, B. and Gabel, F. (2016) SAXS/SANS on Supercharged Proteins Reveals Residue-Specific Modifications of the Hydration Shell. *Biophys. J.* 110(10), 2185-2194.

Appolaire, A., Colombo, M., Basbous, H., Gabel, F., Girard, E. and Franzetti, B. (2016) TET peptidases: A family of tetrahedral complexes conserved in prokaryotes. *Biochimie* 122, 188-196.

2015

Vauclare, P., Marty, V., Fabiani, E., Martinez, N., Jasnin, M., Gabel, F., Peters, J., Zaccai, G. and Franzetti, B. (2015) Molecular adaptation and salt stress response of Halobacterium salinarum cells revealed by neutron spectroscopy. *Extremophiles* 19(6), 1099-1107.

Schirò, G., Fichou, Y., Gallat, F.-X., Wood, K., Gabel, F., Moulin, M., Härtleln, M., Heyden, M., Colletier, J.-P., Orecchini, A., Paciaroni, A., Wuttke, J., Tobias, D. J. and Weik, M. (2015) Translational diffusion of hydration water correlates with functional motions in folded and intrinsically disordered proteins. *Nat. Commun.* 6, 6490.

*Gabel, F. (2015) Small-Angle Neutron Scattering for Structural Biology of Protein–RNA Complexes. *Meth. Enzymol.* 558, 391-415.

*Kim, H. and Gabel, F. (2015) Uniqueness of quasi-atomic models of bio-macromolecular complexes derived from small-angle scattering data. *Acta Crystallogr. D Biol. Crystallogr.* 71(Pt 1), 57-66.

2014

*Appolaire, A., Girard, E., Colombo, M., Durá, M.A., Moulin, M., Härtleln, M., Franzetti, B. and Gabel, F. (2014) Small angle neutron scattering reveals the assembling mode and oligomeric organization of TET, a large dodecameric aminopeptidase. *Acta Crystallogr. D Biol. Crystallogr.* 70(Pt11), 2983-2993.

Hennig, J., Militti, C., Popowicz, G., Wang, I., Sonntag, M., Geerlof, A., Gabel, F., Gebauer, F. and Sattler, M. (2014) Structural basis for the assembly of the SXL-UNR translation regulatory complex. *Nature* 515(7526), 287-290.

Compton, E.L.R., Licandro-Lado, L., Page, K., Härtleln, M., Moulin, M., Norman, D.G., Gabel, F. and Javelle, A. (2014) Conserved structure and domain organisation amongst bacterial Slc26 transporters revealed by a combined Small Angle Neutron Scattering/PELDOR spectroscopy analysis. *Biochem. J.* 463(2), 297-307.

*Gabel, F., Lensink, M.F., Clantin, B., Jacob-Dubuisson, F., Villeret, V. and Ebel, C. (2014) Probing the conformation of the membrane protein FhaC with small angle neutron scattering and molecular modelling. *Biophys. J.* 107(1), 185-196.

Jie-rong Huang, J.-R., Warner, L., Sanchez, C., Gabel, F., Madl, T., Mackereth, C.D., Sattler, M. and Blackledge, M. (2014) Mapping the dynamic conformational equilibrium of the multi-domain splicing factor U2AF65 using NMR and SAXS. *J. Am. Chem. Soc.* 136(19), 7068-7076.

Vauclare, P., Madern, D., Girard, E., Gabel, F., Zaccai, G. and Franzetti, B. (2014) New insights into microbial adaptation to extreme saline environments. *BIO Web of Conferences* 2, 02001.

2013

Lapinaite, A., Simon, B., Skjaerven, L., Rakwalska-Bange, M., Gabel, F. and Carlomagno T. (2013) The structure of the box C/D enzyme reveals regulation of RNA methylation. *Nature* 502(7472), 519-523.

Breyton, C., Flayhan, A., Gabel, F., Lethier, M., Durand, G., Boulanger, P., Chami, M. and Ebel, C. (2013) Assessing the conformation changes of pb5, the Receptor Binding Protein of phage T5, upon binding to its *E. coli* receptor FhuA. *J. Biol. Chem.* 288(42), 30763-30772.

Fragneto, G. and Gabel, F. (2013) Editorial on the Topical Issue "Neutron Biological Physics". *Eur. Phys. J. E Soft Matter* 36(7), 9895.

Breyton, C., Gabel, F., Lethier, M., Flayhan, A., Durand, G., Jault, J.M., Juillan-Binard, C., Imbert, L., Moulin, M., Ravaud, S., Härtle, M. and Ebel, C. (2013) Small angle neutron scattering for the study of solubilised membrane proteins. *Eur. Phys. J. E Soft Matter* 36(7), 9889.

Appolaire, A., Rosenbaum, E., Durá, M.A., Colombo, M., Marty, V., Noirclerc Savoye, M.N., Godfroy, A., Schoehn, G., Girard, E., Gabel, F. and Franzetti, B. (2013) *Pyrococcus horikoshii* TET2 peptidase assembling process and associated functional regulation. *J. Biol. Chem.* 288(31), 22542-22554.

Rennella, E., Cutuil, T., Schanda, P., Ayala, I., Gabel, F., Forge, V., Corazza, A., Esposito, G. and Brutscher, B. (2013) Oligomeric States along the Folding Pathways of β 2-Microglobulin: Kinetics, Thermodynamics, and Structure. *J. Mol. Biol.* 425(15), 2722-2236.

Hennig, J., Wang, I., Sonntag, M., Gabel, F. and Sattler, M. (2013) Combining NMR and Small Angle X-ray and Neutron Scattering in the structural analysis of a ternary protein-RNA complex. *J. Biomol. NMR* 56(1), 17-30.

Dow, J. M., Gabel, F., Sargent, F. and Palmer, T. (2013) Characterisation of a pre-export enzyme-chaperone complex on the twin-arginine transport pathway. *Biochem. J.* 452(1), 57-66.

Marty, V., Jasnin, M., Fabiani, E., Gabel, F., Trapp, M., Peters, J., Zaccai, G. and Franzetti, B. (2013) Molecular dynamics response of *Halobacterium salinarum* to environmental stress revealed *in vivo* by neutron scattering. *J. R. Soc. Interface* 10(82), 20130003.

Sèle, C., Gabel, F., Gutsche, I., Ivanov, I., Burmeister, W. P., Iseni, F., and Tarbouriech, N. (2013) Low Resolution Structure of the Vaccinia Virus DNA Replication machinery. *J. Virol.* 87(3), 1679-1689.

2012

Appolaire, A., Gribaldo, S., Dura, M.A., Rosenbaum, E., Marty, V., Vellieux, F.M.D., Girard, E., Gabel, F., Zaccai, G., and Franzetti, B. (2012) Deciphering the role of large ATP-independent peptidases complexes in extremophilic Archaea. *FEBS J.* 279 SI(1), 31-31.

*Gabel, F. (2012) Small angle neutron scattering (SANS) for the structural study of intrinsically disordered proteins in solution: a practical guide. *Methods Mol. Biol.* 896, 123-135.

Gallat, F.-X., Laganowsky, A., Wood, K., Gabel, F., van Eijk, L., Wuttke, J., Moulin, M., Härtle, M., Eisenberg, D., Colletier, J.-P., Zaccai, G., and Weik, M. (2012) Dynamical coupling of intrinsically disordered proteins and their hydration water: comparison to folded soluble and membrane proteins. *Biophys. J.* 103(1), 129-136.

Peters, J., Trovaslet, M., Trapp, M., Nachon, F., Hill, F., Royer, E., Gabel, F., van Eijck, L., Masson, P. and Tehei, M. (2012). Activity and molecular dynamics relationship within the family of human Cholinesterases. *Phys. Chem. Chem. Phys.* 14, 6764-6770.

Neves, D., Estrozi, L. F., Job, V., Gabel, F., Schoehn, G., and Dessen, A. (2012) Conformational states of a bacterial alpha2-macroglobulin resemble those of human complement C3. *PLoS ONE* 7(4), e35384.

Silvers, R., Sziegat, F., Tachibana, H., Segawa, S., Whittaker, Günther, U. L., Gabel, F., Huang, J., Blackledge, M., Wirmer-Bartoschek, J., and Schwalbe, H. (2012) Modulation of Structure and Dynamics by Disulfide Bond Formation in Unfolded States. *J. Am. Chem. Soc.* 134(15), 6846-6854.

Sharma, K. S., Durand, G., Gabel, F., Bazzacco, P., Le Bon, C., Billon-Denis, E., Catoire, L. J., Popot, J.-L., Ebel, C., and Pucci, B. (2012) Non-Ionic Amphiphilic Homopolymers: Synthesis, Solution Properties and Biochemical Validation. *Langmuir* 28, 4625-4639.

Huang, J., Gabel, F., Ringkjøbing Jensen, M., Grzesiek, S., and Blackledge, M. (2012) Sequence-Specific Mapping of the Interaction between Urea and Unfolded Ubiquitin from Ensemble Analysis of NMR and Small Angle Scattering Data. *J. Am. Chem. Soc.* 134(9), 4429-4436.

*Gabel, F. (2012) A simple procedure to evaluate the efficiency of bio-macromolecular rigid-body refinement by small-angle scattering. *Eur. Biophys. J.* 41(1), 1-11.

Rosenbaum, E., Gabel, F., Durá, M. A., Finet, S., Cléry-Barraud, C., Masson, P. and Franzetti, B. (2012) Effects of hydrostatic pressure on the quaternary structure and enzymatic activity of a large peptidase complex from *Pyrococcus horikoshii*. *Arch. Biochem. Biophys.* 517(2), 104-110.

2011

El Ghachi, M., Mattei, P.-J., Ecobichon, C., Martins, A., Hoos, S., Schmitt, C., Colland, F., Ebel, C., Prévost, M.-C., Gabel, F., England, P., Dessen, A., and Boneca, I.G. (2011) Characterization of the elongosome core PBP2:MreC complex of *helicobacter pylori*. *Mol. Microbiol.* 82(1), 68-86.

Ebel, C., Breyton, C., Gabel, F., Abela, M., Pierre, Y., Lebaupain, F., Durand, G., Popot, J.L., and Pucci, B. (2011) Fluorinated surfactants (FSs) for studying membrane proteins (MPs). *Eur. Biophys. J.* 40(Suppl. 1), 155-155.

*Gabel, F. (2011) Combining small-angle neutron and X-ray scattering for studying protein denaturation. *Neutron News* 22(3), 20-23.

Compton, E.L.R., Karinou, E., Naismith, J.H., Gabel, F., and Javelle, A. (2011) Low-resolution structure of a dimeric SLC26 transporter suggests a dynamic multidomain organisation. *J. Biol. Chem.* 286(30), 27058-27067.

Jensen, M.R., Communie, G., Ribeiro, E.A. Jr., Martinez, N., Desfosses, A., Salmon, L., Mollica, L., Gabel, F., Jamin, M., Longhi, S., Ruigrok, R.W. and Blackledge, M. (2011) Intrinsic disorder in measles virus nucleocapsids. *Proc. Natl. Acad. Sci. USA* 108(24), 9839-9844.

Popot, J.L., Althoff, T., Bagnard, D., Banères, J.L., Bazzacco, P., Billon-Denis, E., Catoire, L.J., Champeil, P., Charvolin, D., Cocco, M.J., Crémel, G., Dahmane, T., de la Maza, L.M., Ebel, C., Gabel, F., Giusti, F., Gohon, Y., Goormaghtigh, E., Guittet, E., Kleinschmidt, J.H., Kühlbrandt, W., Le Bon, C., Martinez, K.L., Picard, M., Pucci, B., Sachs, J.N., Tribet, C., van Heijenoort, C., Wien, F., Zito, F., Zoonens, M. (2011) Amphipols from a to z*. *Annu. Rev. Biophys.* 40, 379-408.

Garcia-Saez, I., Lacroix, F.B., Blot, D., Gabel, F. and Skoufias, D.A. (2011) Structural Characterization of HBXIP: The Protein That Interacts with the Anti-Apoptotic Protein Survivin and the Oncogenic Viral Protein HBx. *J. Mol. Biol.* 405(2), 331-340.

Madl, T., Gabel, F., and Sattler, M. (2011) Structural analysis of (large) protein complexes from NMR and Small Angle Scattering. *J. Struct. Biol.* 173(3), 472-482.

2010

Falb, M., Amata, I., Gabel, F., Simon, B. and Carlomagno, T. (2010) Structure of the K-turn U4 RNA: a combined NMR and SANS study. *Nucleic Acids Res.* 38(18), 6274-6285.

Salvay, A.G., Gabel, F., Fabiano, A.-S., Santos, J., Howard, E.I., and Ebel, C. (2010) Characterization of fish type III antifreeze protein in solution: structure and function. *Biophys. J.* 99(2), 609-618.

Wood, K., Tobias, D.J., Kessler, B., Gabel, F., Oesterhelt, D., Weik, M., Mulder, F.A.A. and Zaccai, G. (2010) The low temperature inflection observed in neutron scattering of proteins is due to methyl rotation: direct evidence using labelling and molecular dynamics simulations. *J. Am. Chem. Soc.* 132(14), 4990-4991.

2009

Masson, S., Kern, T., Le Gouëllec, A., Giustini, C., Simorre, J.-P., Callow, P., Vernet, T., Gabel, F., and Zapun, A. (2009). The central domain of DivIB caps the 1 C-terminal regions of the FtsL/DivIC coiled-coil rod. *J. Biol. Chem.* 284(40), 27687-27700.

Breyton, C., Gabel, F., Abla, M., Pierre, Y., Lebaupain, F., Durand, G., Popot, J.-L., Ebel, C., and Pucci, B. (2009). Micellar and biochemical properties of (hemi)fluorinated surfactants are controlled by the size of the polar head. *Biophys. J.* 97(4), 1077-1086.

*Gabel, F., Ringkjøbing-Jensen, M., Zaccai, G., and Blackledge, M. (2009). Quantitative Model-free Analysis of Urea Binding to Unfolded Ubiquitin using a Combination of Small Angle X-ray and Neutron Scattering. *J. Am. Chem. Soc.* 131(25), 8769-8771.

Durá, M. A., Rosenbaum, E., Larabi, A., Gabel, F., Vellieux, F. M. D. and Franzetti, B. (2009). The structural and biochemical characterizations of a novel TET peptidase complex from *Pyrococcus horikoshii* reveal an integrated peptide degradation system in hyperthermophilic Archaea. *Mol. Microbiol.* 72(1), 26-40.

*Gabel, F., Masson, P., Froment, M.-T., Doctor, B. P., Saxena, A., Silman, I., Zaccai, G. and Weik, M. (2009). Direct correlation between molecular dynamics and enzymatic stability: a comparative neutron scattering study of native human butyrylcholinesterase and of its "aged" soman conjugate. *Biophys. J.* 96(4), 1489-1494.

Frölich, A., Gabel, F., Jasnin, M., Lehnert, U., Oesterhelt, D., Stadler, A. M., Tehei, M., Weik, M., Wood, K., and Zaccai, G. (2009). From shell to cell: neutron scattering studies of biological water dynamics and coupling to activity. *Faraday Discuss.* 141, 117-130.

2008

Gabel, F., Simon, B., Nilges, M., Petoukhov, M., Svergun, D. and Sattler, M. (2008). A structure refinement protocol combining NMR residual dipolar couplings and small angle scattering restraints. *J. Biomol. NMR* 41(4), 199-208.

Wood, K., Plazanet, M., Gabel, F., Kessler, B., Oesterhelt, D., Zaccai, G. and Weik, M. (2008). Dynamics of hydration water in deuterated purple membranes explored by neutron scattering. *Eur. Biophys. J.* 37(5), 619-626.

2007

Wood, K., Plazanet, M., Gabel, F., Kessler, B., Oesterhelt, D., Tobias, D.J., Zaccai, G. and Weik, M. (2007). Coupling of protein and hydration-water dynamics in biological membranes. *Proc. Natl. Acad. Sci. USA*, 104(46), 18049-18054.

*Gabel, F., and Bellissent-Funel, M.-C. (2007). *C-phycocyanin* hydration water dynamics in the presence of trehalose: an incoherent elastic neutron scattering study at different energy resolutions *Biophys. J.* 92(11), 4054-4063.

Tehei, M., Franzetti, B., Wood, K., Gabel, F., Fabiani, E., Jasnin, M., Zamponi, M., Oesterhelt, D., Zaccai, G., Ginzburg, M. and Ginzburg, B.-Z. (2007). Neutron scattering reveals extremely slow cell water in a Dead Sea organism. *Proc. Natl. Acad. Sci. USA* 104(3), 766-771.

2006

Gabel, F., Wang, D., Madern, D., Sadler, A., Dayir, K., Zamanian Daryoush, M., Schwahn, D., Zaccai, G., Lee, X. and Williams, B. R. G. (2006). Dynamic flexibility of human double-stranded RNA activated PKR molecules in solution. *J. Mol. Biol.* 359(3), 610-623.

Pimienta, G., Gabel, F., Zanier, K., Conti, E. and Sattler, M. (2006). Chemical shift backbone assignments of TAP-N, the cargo-binding region of the protein TAP. *J. Biomol. NMR* 36 Suppl 5, 23.

*Gabel, F., Simon, B. and Sattler, M. (2006). A target function for quaternary structural refinement by combining small angle scattering and NMR orientational restraints. *Eur. Biophys. J.* 35(4), 313-327.

2005

*Gabel, F. (2005). L'influence du solvant sur la dynamique interne de la butyrylcholinestérase et sur la dynamique de l'eau d'hydratation : une étude par diffusion élastique incohérente de neutrons. *J. Phys. IV.* 130, 133-140.

Gabel, F., Weik, M., Doctor, B. P., Saxena, A., Fournier, D., Brochier, L., Renault, F., Masson, P., Silman, I. and Zaccai, G. (2005). Effects of soman inhibition and of structural differences on cholinesterase molecular dynamics: a neutron-scattering study. *Biophys. J.* 89(5), 3303-3311.

*Gabel, F. (2005). Protein dynamics in solution and powder measured by incoherent elastic neutron scattering: the influence of Q-range and energy resolution. *Eur. Biophys. J.* 31(1), 1-12.

2004

Gabel, F., Weik, M., Doctor, B. P., Saxena, A., Fournier, D., Brochier, L., Renault, F., Masson, P., Silman, I. and Zaccai, G. (2004). The influence of solvent composition on global dynamics of human butyrylcholinesterase powders: a neutron-scattering study. *Biophys. J.* 86(5), 3152-3165.

2002

Gabel, F., Bicout, D., Lehnert, U., Tehei, M., Weik, M. and Zaccai, G. (2002). Protein dynamics studied by neutron scattering. *Q. Rev. Biophys.* 35, 327-367.

(* = corresponding author)